Adapting Pharmacy Education to the Needs of Society:

A Research Journey to Prepare Collaborative, Practice-ready Pharmacists

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In the name of God, the Compassionate, the Merciful

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Contents

Abstract 13
Chapter 1: Introduction 15
1.1 Background 15
1.2 Description of the author professional and academic role 16
1.3 Healthcare system and pharmacy practice in Kuwait 18
1.4 Pharmaceutical care practice 21
1.4.1 Parenteral nutrition therapy 23
1.5 Pharmacy education in Kuwait 25
1.5.1 Active learning methods in pharmacy education 27
1.5.2 Competency-based education in pharmacy 29
1.5.3 Interprofessional education for pharmacists 32
1.5.4 Simulation-based education for pharmacists 34
1.5.5 Continuing professional development and continuing education of pharmacists 37
1.6 Purpose of research and structure of thesis 38
1.7 Aim and objectives 39
1.7.1 Aim of thesis 39
1.7.2 Objectives 39
Chapter 2: Methods 45
2.1 Overview of the settings and research methods used in the publications 45
2.2 Quantitative methods (surveys) 46
2.2.1 Study population and sampling 47
2.2.2 Survey design and administration 48
2.2.3 Quantitative data analysis 55
2.2.4 Advantages and disadvantages of surveys 56
2.3 Qualitative methods (interviews) 57
2.3.1 Sampling in qualitative research 58
2.3.2 Types of interviews and development of interview guide 58
2.3.3 Qualitative data analysis 61
2.3.4 Advantages and disadvantages of qualitative research 62
2.4 Descriptive studies 66

2.5 Literature reviews 68

Chapter 3: Pharmaceutical care: exploring attitudes, barriers to implementation and current practices 74

3.1 Introduction 74

3.1.1 Pharmaceutical care 74

3.1.2 Pharmaceutical care and pharmacy education 75

3.1.3 Parenteral nutrition 76

3.2 Key publication 1: Pharmaceutical care in Kuwait: pharmacy students' 77

perspectives 77

3.2.1 Background 77

3.2.2 Article development 77

3.2.3 Key findings 78

3.2.4 Discussion and impact of the publication 79

3.3 Key publication 2: Pharmaceutical care in Kuwait: hospital pharmacists' perspectives 81

3.3.1 Background 81

3.3.2 Article development 81

3.3.3 Key findings 82

3.3.4 Discussion and impact of the publication 82

3.4 Key publication 3: Parenteral nutrition in hospital pharmacies: exploring the practices and identifying opportunities for quality improvement 84

3.4.1 Background 84

3.4.2 Article development 85

3.4.3 Key findings 85

3.4.4 Discussion and impact of the publication 86

3.5 Key publication 4: Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait 88

3.5.1 Background 88

3.5.2 Article development 88

3.5.3 Key findings 89

3.5.4 Discussion and impact of the publication 90

3.6 Key publication 5: Role of pharmacists in providing parenteral nutrition support: current insights and future directions 92

3.6.1 Background 92

3.6.2 Article development 93
3.6.3 Key findings 93
3.6.4 Discussion and impact of the publication 94
3.7 Summary 95
Chapter 4: Pharmaceutical care: from classroom to clinical practice 97
4.1 Introduction 97
4.2 Key publication 6: Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students 102
4.2.1 Background 102
4.2.2 Article development 103
4.2.3 Key findings 103
4.2.4 Discussion and impact of the publication 104
4.3 Publications on competency-based pharmacy education: 106
Key publication 7: Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs (chapter) 106
Key publication 8: Competency-based education in pharmacy: a review of its development, applications, and challenges (review article) 106
4.3.1 Background 106
4.3.2 Chapter development 107
4.3.3 Article development 107
4.3.4 Key findings of the publications on CBPE 109
4.3.5 Discussion and impact of the publications on CBPE 118
4.4 Summary 119
Chapter 5: Interprofessional education and simulation-based education for integrating collaborative working to support pharmaceutical care practice 122
5.1 Introduction 122
5.2 Key publication 9: Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait 126
5.2.1 Background 126
5.2.2 Article development 127
5.2.3 Key findings 128
5.2.4 Discussion and impact of the publication 128
5.3 Key publication 10: Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty 131

5.3.1 Background 131
5.3.2 Article development 132
5.3.3 Key findings 133
5.3.4 Discussion and impact of the publication 134
5.4 Key publication 11: Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students 136
5.4.1 Background 136
5.4.2 Article development 137
5.4.3 Key findings 138
5.4.4 Discussion and impact of the publication 138
5.5 Key publication 12: Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice 141
5.5.1 Background 141
5.5.2 Article development 142
5.5.3 Key findings 143
5.5.4 Discussion and impact of the publication 144
5.6 Key publication 13: “As-if”: a tool for experiencing team-based care 146
5.6.1 Background 146
5.6.2 Article development 146
5.6.3 Discussion and utility of the publication 147
5.7 Summary 148
Chapter 6: Conclusions 150
References 155
Appendices 192
Appendix 1: Full publication list and other academic achievements of the author 192
Appendix 2: The author’s input into the key publications described in this thesis and the roles of the author and co-authors 201
Appendix 3: Key publications described in Chapter 3 208
Appendix 4: Key publications described in Chapter 4 210
Appendix 5: Key publications described in Chapter 5 211

List of Tables

Table 1.1: The structure of thesis. 43

Table 2.1: Summary of the methods used in the publications……. .. 72

Table 4.1: Examples of pharmacy competency frameworks/standards for professional practice and educational outcomes emphasising competency development……..110

List of Figures

Figure 1.1: The described themes in this thesis and a list of the key publications under each theme..... 44

Figure 4.1: The needs-based education development cycle……..113

List of Abbreviations

AACP	American Association of Colleges of Pharmacy
ACGME	Accreditation Council for Graduate Medical Education
ACPE	Accreditation Council for Pharmacy Education
AFPC	Association of Faculties of Pharmacy of Canada
ASHP	American Society of Health-System Pharmacists
ASPEN	American Society for Parenteral and Enteral Nutrition
ATHCTS	Attitudes Towards Health Care Teams Scale
B Pharm	Bachelor of Pharmacy
CAIPE	Centre for the Advancement of Interprofessional Education
CanMEDs	Canadian Medical Education Directives for Specialists
CAPE	Centre for the Advancement of Pharmacy Education
CBE	Competency-based education
CBL	Case-based learning
CBPE	Competency-based pharmacy education
CE	Continuing education
CoDEG	Competency Development and Evaluation Group
CPD	Continuing professional development
CPOE	Computerised prescriber-order-entry
DDI	Dasman Diabetes Institute

DTPs	Drug therapy problems
EAHP	European Association of Hospital Pharmacists
EHRs	Electronic health records
EPAs	Entrustable Professional Activities
FIP	International Pharmaceutical Federation
GI	Gastrointestinal
GPhC	General Pharmaceutical Council
HPS	Human patient simulation
HSC	Health Sciences Centre
IPCP	Interprofessional collaborative practice
IPE	Interprofessional education
IQR	Interquartile range
IT	Information technology
MoH	Ministry of Health
MSc	Masters of Science
NAPRA	National Association of Pharmacy Regulatory Authorities
NSPs	Nutrition support pharmacists
NST	Nutrition support team
OBE	Outcome-based education
PBL	Problem-based learning
PC	Pharmaceutical care
PCAS	Standard Pharmaceutical Care Attitude Survey
PCNE	Pharmaceutical Care Network Europe

PET	Pharmacy Education Taskforce
PharmD	Doctor of Pharmacy
PN	Parenteral nutrition
PREP	Perceptions of Preparedness to Provide Pharmaceutical Care
RIPLS	Readiness for Interprofessional Learning Scale
SATP^{2}C	Scale of Attitudes Towards Physician-Pharmacist Collaboration
SBE	Simulation-based education
SP	Standardised patient
SPSS	Statistical Package for Social Sciences
TPN	Total parenteral nutrition
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States of America
WHO	World Health Organisation

Abstract

Pharmaceutical care (PC) is a practice philosophy that embraces all the activities that pharmacists perform to optimise patients' medications use. The author explored PC practice in Kuwait and investigated areas of developments in pharmacy education to support its provision.

The thirteen publications presented in this thesis are organised into three themes. The first theme focussed on PC practice whereby the attitudes of pharmacy students and hospital pharmacists towards PC and views on the barriers to its implementation were explored using survey-based studies. The findings indicated that attitudes towards PC were positive but PC practice was limited and challenged by several professional, organisational and technical barriers including lack of teamwork among healthcare professionals. The role of pharmacists in parenteral nutrition therapy was investigated using qualitative interviews to explore the extent of PC practice implementation at hospitals. This further revealed lack of collaborative practice and the limited clinical role of pharmacists in this specialised area. The resulting publications highlighted the needed educational and organisational reforms to support PC practice in Kuwait.

Therefore, the second and third themes explored instructional techniques and educational models that are applied in other countries to prepare pharmacy students for PC practice and the feasibility of their implementation in Kuwait.

The thesis describes the author's published descriptive studies and literature reviews on the use of active learning methods and competency-based pharmacy education to equip pharmacy students with the necessary professional competencies. It further describes simulation-based education and interprofessional education (IPE) for integrating collaborative practice to support PC provision. Survey-based research was used to assess the attitudes of health faculty members and students in Kuwait University towards IPE. In general, there were positive attitudes towards these educational innovations and recommendations were provided for their future implementation including the need for administrative support and good investment in training of faculty members.

The publications included in this thesis were the first to address the topics in question in Kuwait and the author became recognised as an expert in these fields. Pharmacy education in Kuwait has been evolving by adopting the Doctor of Pharmacy programme and developing IPE curriculum. The thesis provides recommendations for imbedding educational strategies in the pharmacy curriculum to prepare pharmacy graduates to become collaborative, practice-ready PC practitioners capable of providing the PC services that the society needs and deserves.

Chapter 1: Introduction

1.1 Background

The pharmacy profession has undergone major evolutions during the past years, transforming pharmacy practice from traditional duties to the modern provision of direct patient care. Pharmacists have been increasingly required to provide clinical pharmacy services to meet patients' needs for the safe and effective use of medications.[1] Direct patient care encompasses clinical pharmacists' activities, in which they directly observe patients and participate in selecting, modifying and monitoring patient-specific drug therapy in collaboration with other members of the interprofessional healthcare team.[2] To assume this role in patient care, pharmacists need to implement pharmaceutical care (PC) practice and to act as active members within multidisciplinary healthcare teams.[3]

In developed countries, pharmacy practice has witnessed advancement of clinical pharmacy services and development of collaborative practice models such as medication therapy management.[4] By adopting these models, pharmacists work together with other healthcare professionals to provide collaborative care to patients which in turn leads to improved patient care and clinical outcomes.[4-6] On the other hand, pharmacy practice advancement in developing countries has been slower than that accomplished in developed countries with the vast majority of pharmacists performing technical pharmacy responsibilities.[7] More recently, the health and regulatory authorities in these countries have realised the key role that pharmacists can have in patient care.[8] Consequently, pharmacy education has witnessed substantial developments including the replacement of

traditional teaching methods with active learning methods to equip pharmacy graduates with the professional competencies required for modern pharmacy practice.[9]

1.2 Description of the author professional and academic role

The author graduated with a Bachelor of Science (BSc) degree in Pharmacy from a School of Pharmacy in the Hashemite Kingdom of Jordan in 2001. She, then, completed Masters of Science (MSc) degree in Pharmacology from the Kuwait University Faculty of Medicine in 2005. The author started her career as a pharmacist in one central community pharmacy in Kuwait, where she practised for two years (from 2005 to 2007). During that period, she developed experience in the management of community pharmacy services. There is only one School of Pharmacy in Kuwait, the Kuwait University Faculty of Pharmacy. In 2007, the author joined Kuwait University Faculty of Pharmacy as an academic support staff member (a Teaching Assistant) in the Department of Pharmacology and Therapeutics. As part of her job duties in that academic post, the author participated in the delivery of teaching and learning activities to pharmacy students. The author also served on several committees and working groups to support educational and research activities at the Faculty.

While the author was working at the Faculty, she completed an MSc degree in Diabetes Care and Education in 2015. This postgraduate programme was offered by the University of Dundee, Scotland, the United Kingdom (UK) in collaboration with the Dasman Diabetes Institute (DDI) to healthcare professionals in Kuwait. The structure of this three-year programme was designed to allow the participants to graduate with an MSc degree

but participants could exist the programme after one or two years of study and be awarded a certificate or diploma, respectively. The programme was delivered using a blended learning model that included face-to-face teaching by staff members from the University of Dundee who regularly visited Kuwait. During this study, the author completed a number of educational modules and she gained an understanding about simulation-based education (SBE). She implemented this instructional technique to complete her MSc degree research project in which she conducted a series of simulation-based educational workshops for pharmacists practising in all governmental hospitals in Kuwait.[10] The author published three articles as a result of this research project.[10-12] These publications are excluded from this thesis because they represent the outcomes of another degree. Following to her graduation, the author voluntarily joined the University of Dundee staff members to instruct other participants in the programme. Therefore, she was awarded an honorary lecturer post at School of Medicine, the University of Dundee from 2016-2019. This post was renewed and is still valid to the date of writing this thesis because of the author's collaboration with staff members of the University of Dundee in research activities.[13]

The author started her research journey mainly due to her passion in research. The author's research interests include the development and evaluation of PC and clinical pharmacy services. This resulted in two publications related to PC and three publications related to parenteral nutrition (PN) therapy that will be described in Chapter 3.[14-18] The author has also been interested in research related to pharmacy education including the use of active learning methods and competency-based pharmacy education (CBPE) which resulted in

published outputs that will be discussed in Chapter 4.[19-21] Moreover, the author investigated students' attitudes towards physician-pharmacist collaboration and explored other educational topics including interprofessional education (IPE) and simulation use for clinical skills development which resulted in a number of publications that will be the scope of Chapter 5.[22-26] The author has also been serving as a reviewer for a number of international journals in the fields of pharmacy practice, pharmacy education, health services research and medical education. The full publication list and other academic achievements of the author are outlined in Appendix 1.

1.3 Healthcare system and pharmacy practice in Kuwait

Kuwait is a Middle Eastern State that resides at the north-western corner of the Arabian Gulf. The Kuwait healthcare system is broadly divided into public and private healthcare systems. The public healthcare system provides healthcare services to the population and is organised into primary, secondary and tertiary levels of healthcare delivery. Primary healthcare is offered to the public by healthcare centres (polyclinics) that serve patients' primary healthcare needs. Secondary healthcare is delivered through seven general hospitals.[27] Tertiary healthcare is provided through fourteen specialised hospitals and health centres.[27] The primary healthcare centres provide comprehensive health services for the population. Patients receive healthcare for minor ailments, follow-up for their chronic diseases and get their medications dispensed at the primary healthcare centres. They can be referred to general hospitals where they can be admitted to the wards if needed. They also attend to the hospital outpatient specialised clinics and get their medications dispensed from hospital outpatient pharmacies. A number of hospitals serve

the employees of Kuwait Oil companies.[27] Private healthcare system includes a number of private hospitals, medical centres, clinics and community pharmacies.

The Ministry of Health (MoH) which is the main regulator of the Kuwait healthcare system runs the country's public healthcare system. The State of Kuwait is divided into six health areas or regions: Capital, Hawali, Al Ahmadi, Al Jahra, Farwania and Al Sabah health areas. According to the 2019/2020 annual bulletin of health statistics which is issued by Kuwait Central Statistics Bureau, the total number of beds in the general and specialised hospitals was 7387 beds (a national rate of 1.9 beds/1000 population).[27] A total number of 10867 physicians were reported to serve in the public healthcare sector, yielding an overall national rate of 2.7 physicians/1000 population).[27]

The health workforce serving in the healthcare system is mainly composed of expatriate healthcare professionals. In 2019, the total number of Kuwaiti physicians working in the MoH, Kuwait Oil companies and private healthcare sector hospitals was 3954 compared to 6913 non-Kuwaitis; the number of Kuwaiti pharmacists was 1402 compared to 3069 non-Kuwaiti pharmacists, whereas the Kuwaiti nurses were 1120 compared to 24960 non-Kuwaiti nurses.[27] However, there have been active efforts to train sufficient national healthcare professionals to reduce the dependence on expatriate healthcare workers.

Clinical pharmacy services are limited in the different healthcare settings in Kuwait.[28, 29] Overall, PC services are not widely provided except limited attempts made by some pharmacists.[30] The practice of most pharmacists mainly involves performing traditional

tasks such as medications dispensing, patient medication education, as well as administrative roles such as management of personnel, medications orders and stock control.[28, 29, 31] Community pharmacists provide essential services to the public,[32] but structured PC services (see section 1.4) are not yet available in community pharmacies.[33] Pharmacists who practise in the pharmacies of the primacy healthcare polyclinics and tertiary healthcare facilities provide pharmaceutical services to patients visiting these settings. In the secondary and tertiary level hospitals, the pharmacies have established different subdivisions including pharmacies to serve inpatients (central pharmacy), pharmacies to provide services near to hospital outpatient clinics (outpatient pharmacy) and emergency departments (emergency pharmacy). Hospital pharmacists provide essential services to cover patients' medications-related needs in the inpatient, outpatient and emergency pharmacies of each hospital.[34] They also compound some pharmaceutical formulations including PN formulas.[34] Hospital pharmacists spend the majority of their time inside pharmacies.[28] Most of the contact between pharmacists and patients takes place in outpatient pharmacies. However, the pharmacy profession has been undergoing a gradual transition towards adopting a clinically oriented practice. An increasing number of clinical pharmacists has been gradually introducing clinical pharmacy services at the hospitals.[34] Some pharmacists also practise at the regulatory departments of Kuwait MoH.

As mentioned above, pharmacists practising in Kuwait healthcare system include both Kuwaiti nationals and expatriates who are graduates from Kuwait, and several other countries including some Middle Eastern countries, the UK and India. The pharmacy staff working at the different clinical settings of the public healthcare system also includes

pharmacy technicians who mainly perform technical pharmacy duties in the pharmacies. They participate in medications dispensing, patient counselling, medications stock management and formulation. These technicians complete an intensive two- and half-year programme at the Department of Pharmaceutical Sciences, College of Health Sciences, the Public Authority for Applied Education and Training in Kuwait. During their study in this programme, students undertake courses covering basic pharmaceutical sciences and complete field training at different practice settings. They graduate with a Pharmacy Technician Diploma and serve at the pharmacies of the public healthcare system.

1.4 Pharmaceutical care practice

The concept of PC was introduced in the 1990s as a practice philosophy which involves pharmacist's responsible and direct provision of medication-related care to patients to achieve definite outcomes that improve their quality of life.[35, 36] It is a cooperative practice by which a pharmacist collaborates directly with the patient and other healthcare professionals in designing, implementing and monitoring a therapeutic plan with the purpose of identifying, resolving and preventing drug therapy problems (DTPs) to ensure the most effective use of medications.[36] There is cumulative evidence in the literature documenting the benefits of PC on improving patient care and clinical outcomes,[37, 38] and achieving healthcare costs savings.[37]

The provision of PC by pharmacists has been regarded as the mission of the profession.[36] Clinical pharmacy practice adopts the philosophy of PC.[3] For pharmacists to provide direct patient care, they need to have adequate knowledge, skills, and positive attitudes to

implement PC practice.[2] Pharmacy schools and colleges have incorporated PC education into their educational programmes.[39] However, several barriers impede the broad implementation of PC practice in many countries such as lack of pharmacist time, poor clinical knowledge and communication skills of individuals and poor teamwork.[37, 39, 40]

A number of studies described PC practice and research in developed countries,[37-44] but only a limited number of publications investigated PC in developing countries.[45-49] Clinical pharmacy services are suboptimal in the healthcare settings in Kuwait and adoption of PC practice is still in its early stage of development.[28-30] In an earlier study in 2006, hospital pharmacists reported that they perform some PC activities but the study identified lack of pharmacists' understanding of PC practice.[46]

The pharmacy curriculum of Kuwait University Faculty of Pharmacy has been designed to allow pharmacy students to learn about the philosophy and practice of PC during their academic study.[14, 33] Adopting the PC philosophy by pharmacy students and practitioners and having adequate PC knowledge and skills, and positive attitudes towards this practice philosophy are essential to establish clinical pharmacy services in Kuwait.[14, 15] The attitudes of pharmacy students,[48, 49] and pharmacist practitioners,[44, 45, 47] towards PC have been reported in some countries, but no similar studies previously investigated these topics in Kuwait.[14, 15] There was also limited evidence on the preparedness of Kuwait pharmacy students and pharmacists to provide PC services and their perceived barriers to PC provision.[14, 15] Therefore, the author conducted two survey-based studies that were published in 2014 to explore the attitudes of pharmacy students and hospital pharmacists

towards PC and their opinions about the barriers to PC implementation.[14, 15] These studies will be discussed in Chapter 3.

1.4.1 Parenteral nutrition therapy

The PN therapy is used to supply vital nutrients to patients who are incapable to receive oral/enteral feeding due to dysfunctional or inaccessible gastrointestinal (GI) tract.[50] This therapy involves the intravenous administration of sterile, nutritionally sufficient formulations composed of water, dextrose, amino acids, electrolytes, vitamins and trace elements to patients through central or peripheral venous lines.[50] It constitutes a life-sustaining solution for patients with different clinical conditions including critically ill patients, premature infants and patients with constant loss of GI function.[50, 51]

The term total parenteral nutrition (TPN) is used to describe PN therapy when patient exclusively receives all the daily nutritional requirements through PN formulations.[18] Standards PN formulations have been manufactured by industry in some countries.[52] In many other countries including Kuwait, hospital pharmacies prepare PN formulations in special TPN units.[16] The PN formulations are typically complex admixtures.[50] The physicochemical compatibility and stability of PN components,[53] and the sterility of the formulations,[50] are essential elements to avoid the complications that may result from PN therapy such as metabolic and septic complications.[54, 55] Accordingly, it is vital to compound PN formulations according to validated pharmaceutical compounding procedures under strict aseptic conditions.[50, 56]

To optimise patient care, PN therapy must be provided to patients by a multidisciplinary team called the Nutrition Support Team (NST).[57, 58] This team includes a physician, pharmacist, dietician and nurse with speciality training in nutrition support.[57, 58] In line with PC practice philosophy, PN therapy can be regarded as a collaborative service in which pharmacists cooperate with healthcare professionals to develop and implement a care plan that best meets patients' specific therapeutic and nutritional needs.[57, 58] Pharmacists can act as essential members of the NST.[59, 60] Nutrition support pharmacists (NSPs) develop specialised practice in this area and can provide a range of valuable services in relation to PN.[58] They organise compounding and dispensing of PN formulas and contribute to the administrative management of nutrition support services.[58] They can participate in development, implementation and monitoring of individualised nutrition care plans for patients receiving PN, and in the detection and resolution of DTPs.[58, 60, 61] The provision of PC services to patients receiving PN therapy has been shown to result in significant clinical benefits for these patients.[61, 62]

In Kuwait, TPN preparation services were introduced into hospitals through the establishment of a TPN unit within the hospital pharmacy department of one governmental hospital in 1982.[16, 17] The TPN preparation services have expanded since then and are currently provided at six general hospitals in addition to one private hospital.[16, 17] A review of the literature revealed several studies describing PN practices in developed countries in Europe and North America,[63-66] but there were no previous studies investigating PN practices in hospitals of Kuwait.[16, 17] None of the earlier studies describing PC practice in Kuwait has investigated this area of pharmacy practice.[15, 46]

Therefore, the author published two articles about PN in 2016 to explore these topics in Kuwait hopitals.[16, 17] A key professional organisation in nutrition support, the American Society for Parenteral and Enteral Nutrition (ASPEN) released standards of practice for NSPs delineating their role in PN therapy.[58] Nonetheless, there were no literature review articles that describe the literature supporting the different services that pharmacists provide to patients receiving PN therapy.[18] This encouraged the author to publish a literature review article about the role of pharmacists in providing PN support in 2018.[18] These three publications will be discussed in detail in Chapter 3.

1.5 Pharmacy education in Kuwait

The Faculty of Pharmacy is a public School of Pharmacy in Kuwait that was established in 1996. It is located within Kuwait University Health Sciences Centre (HSC) which includes Faculty of Medicine, Faculty of Dentistry, Faculty of Pharmacy, Faculty of Allied Health Sciences and Faculty of Public Health. These Health Faculties (Schools) are the only schools that provide education and training to healthcare professionals of major health disciplines in the country.

The Faculty of Pharmacy offered a Bachelor of Pharmacy (B Pharm) degree programme since its establishment. This was a five-year programme in which students undertake the first year with medical and dental students to complete pre-professional courses.[14] Pharmacy students then undertake professional courses for the remaining four years.[14]

The Faculty of Pharmacy integrated PC education into the B Pharm programme.[14, 33] Students learn about PC definition and basic principles initially during the second year of study in the pharmacy practice course.[14, 33] Then, they learn about PC services in relation to the management of several disease conditions in the third through the fourth year.[14, 33] The teaching methods have mainly consisted of didactic lectures, which are reinforced with practical laboratories and small group learning activities, as well as experiential training, as described below, during the last two years of the programme.[11, 14, 31, 33] Students dispensing of simulated prescriptions is also employed for training students on patient counselling skills.[31]

Experiential learning is an integral component of the education of pharmacists and involves learning at practice sites where knowledge can be constructed from real-life experiences.[9, 67] In Kuwait, pharmacy students enrolled in the B Pharm programme undertake experiential training in primary healthcare centres and community pharmacies during the fourth year, and in hospital settings during the fifth year of their study.[14, 33] In fifth year, it involves spending six hours of training for two days/week during the first semester and for four days/week during the second semester. Students' training at these sites has been based on the current practice of pharmacists which mainly includes traditional pharmacy roles.[14] Although experiential training has been a component of students' learning experience, the majority of B Pharm programme coursework time is spent in traditional teaching sessions. Unlike pharmacy education in the UK,[68] there is no required pre-registration training for pharmacy graduates in Kuwait as the experiential training is integrated as part of the requirement of the undergraduate pharmacy degree. In

view of this structure of the B Pharm curriculum, the author felt that there was no adequate integration of active learning methods, as described below, in the class-based courses of the curriculum. This led the author to explore the use of these methods and to describe these educational experiences in three of her publcations.[10, 19, 26]

As part of the development process in pharmacy education in Kuwait, the Faculty of Pharmacy developed a two-year add-on (post baccalaureate) Doctor of Pharmacy (PharmD) programme in 2016 to prepare clinical pharmacists.[26, 33, 34] In 2020, the Faculty transformed the pharmacy curriculum into an entry-to-practice PharmD programme with a plan to accept all new student intake in this programme. The Kuwait MoH has also been providing scholarships for Kuwaiti pharmacists to complete postgraduate qualifications in clinical pharmacy from the UK and other countries to support development of clinical pharmacy services.[33]

1.5.1 Active learning methods in pharmacy education

Pharmacy education aims to equip students with the competencies necessary for their future professional practice.[69] Modern educational theories, such as the adult learning theory (andragogy) proposed by Knowles underline the value of the active participation of learners in the learning process and promote a learner-centred approach.[70-72] Andragogy describes the science and art of supporting adults to learn.[70] It implies that adults are independent and self-directed learners.[70] They have gathered sufficient experience which is a rich source for learning.[70] Adult learners value learning that serves everyday life demands and they are more interested in immediate and problem-based

approaches.[70] Moreover, they are motivated to learn by internal drives.[70] Therefore, it is essential to adopt learning strategies that actively involve students in the learning process.[73] This would require transforming learners from the practice of simple knowledge acquisition (by memorisation) towards integration, application, reinforcement and advancement of knowledge, skills and attitudes which are developed through the pharmacy curriculum.[74] Lectures can be used to construct introductory concepts and basic knowledge,[75] but students must not act as passive recipients of factual knowledge.[69]

Active learning is a teaching approach that involves students' participation in carefully designed activities which can facilitate their engagement and improve motivation in the classroom and in experiential learning environments.[74] Examples of active learning methods include problem-based learning (PBL), case-based learning (CBL), small group learning and role-playing.[69, 74] In PBL, small groups of students are provided with practical, open-ended problems to solve in a learning experience in which students become self-directed for constructing their own learning under the guidance of faculty members.[74] In CBL, large-groups of students are presented with real-world cases to solve following an assigned reading and/or a mini-lecture with subsequent class discussions.[74] Small group learning activities such as group discussion advances students' abilities to effective listening, presenting and networking.[76] It enhances in-depth understanding of topics and develops students' advanced levels of intellectual skills such as reasoning and evaluation.[77] This approach also stimulates social and communication skills such as questioning, listening, debating and collaboration.[76, 77] Role-playing allows learners to enact scenarios which resemble situations that may occur in practice.[78] Simulated

experiences and role-playing involve students' interaction with real or standardised patients (SPs) to practise essential skills such as physical assessment, counselling and communication.[79-81] The use of active learning methods as part of pharmacy students' education and training enhances knowledge acquisition and retention, improves critical thinking, clinical decision-making and problem-solving skills, and advances professionalism.[69, 74] Students must also have sufficient opportunities for experiential training as it helps them to become active, independent and self-directed learners.[69, 79]

Patients counselling regarding their medications is necessary for comprehensive PC practice.[41, 82] Counselling improves patients' adherence to therapy and decreases DTPs.[83] A previous report has demonstrated that the engagement of pharmacy students in various active learning methods improved their counselling skills in a medication therapy management course.[81] Diabetes mellitus is one of the most common chronic conditions among the population of Kuwait.[84] The author conducted a workshop that integrated different active learning methods to train final-year pharmacy students on patient counselling about antidiabetic medications.[19] She published an article describing this educational initiative in 2013.[19] This article is described in Chapter 4.

1.5.2 Competency-based education in pharmacy

The aim of competency-based education (CBE) is to instill in healthcare graduates the professional competencies needed to effectively deliver services that best meet patients and societal needs.[20, 21] Competencies involve the knowledge, skills, attitudes and behaviours that a person obtains and advances by means of education, training and

professional experience.[85] Practice competence embraces the full range of competencies that practitioners gather over time and enable them to perform their professional duties correctly, make suitable judgments, and interact with patients and colleagues in a proper manner.[86] Competency standards refer to the skills, attitudes, values, beliefs and other attributes that pharmacists develop from education, training and professional experience and allow them to practise the profession.[87] A competency framework describes the comprehensive set of competencies that is essentially required for practice performance.[85]

There are four characteristics for competency-based approaches to education and training. They: 1) stress on outcomes, 2) focus on developing learners' abilities, 3) de-emphasise time-based training, and 4) support learner-centredness.[88, 89] In CBE, the curricula emphasise on achieving outcomes while developing graduates' practice competencies to meet the healthcare needs of their constituents.[88] Programmes based on CBE may provide more flexible timeframe for completion than traditional programmes, thereby allowing leaners to progress at their own pace.[88, 90, 91] This model also indorses learner-centredness and promotes learners' responsibility for pursuing development by mapping one milestone to the next on the path to achievement of competence.[88]

There has been a growing interest in adopting this paradigm in healthcare professionals' education and training during the past years.[89] The CBE model has long been used in physicians' residency training and board certification and it also represents a prerequisite for accreditation of graduate medical education in the Western world.[91-94] Several professional organisations in the field of medicine have developed competency

frameworks for physicians training. These include the Good Medical Practice framework from the UK, the United States (US) Accreditation Council for Graduate Medical Education (ACGME) Outcome Project, and the Canadian Medical Education Directives for Specialists (CanMEDs) framework from Canada.[95-97] Similarly, there has been a growing interest in adopting CBE in dental education.[90] The CBE model has also been integrated into the education and training of nurses, midwives and physician assistants to guarantee that these practitioners have the essential competencies required for their professional practice.[98-100]

A number of publications provided overviews on the application of the CBE model in medicine,[88, 89, 91] dentistry,[90] and nursing.[98] There has also been an emerging evidence describing the use of CBE in pharmacy education but most of the published articles describe experiences in its adoption and implementation in certain institutions or countries.[73, 101, 102] There were no previous publications that describe the use of CBE in pharmacy education from a worldwide perspective.[21]

The Faculty of Pharmacy has adopted CBPE in the add-on PharmD programme and the entry-to-practice PharmD programme. The author conducted a comprehensive literature review to write a chapter on CBPE in an edited textbook about pharmacy education that was published in 2018.[20] Afterwards, the author published a review article on CBPE in a special issue about CBE in the Journal of Evaluation in Clinical Practice in 2020.[21] These publications will be part of the scope of Chapter 4.

1.5.3 Interprofessional education for pharmacists

As outlined above, the practice of PC entails the direct collaboration of pharmacists with patient, physicians and other health professionals.[36, 37] Interprofessional collaborative practice (IPCP) is described by the World Health Organisation (WHO) as "a situation when multiple health workers from different professional backgrounds provide comprehensive services by working with patients, their families, carers and communities to deliver the highest quality of care across settings".[103] Healthcare professionals' collaboration results in increasing coordination in practice, fostering good professional relationships and consequently optimising patient care and clinical outcomes.[104-106] A fundamental approach to preparing health students for IPCP is through implementing IPE.[103] The WHO defines IPE to occur "when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes".[103] Students' participation in IPE has been found effective in enhancing their understanding of the roles and responsibilities of other healthcare professionals, improving their communication skills and fostering positive attitudes towards collaborative practice.[107, 108]

An essential requirement for the provision of effective PC is the presence of good interprofessional relationship among physicians and pharmacists.[37, 109] However, pharmacists' efforts to provide PC services have been challenged by physicians' negative attitudes towards collaboration with pharmacists as being viewed as competitors.[38] Instead of competing over clinical decision-making, the two professions must collaborate

and share the responsibility for therapeutic decisions that result in the best outcomes for the patient.[39]

Healthcare educational programmes must instil in health students the positive attitudes towards collaboration and the necessary IPCP competencies to provide collaborative patient care.[110] There have been some studies that assessed the attitudes of medical and pharmacy students towards physician-pharmacist collaboration in some countries such as the US and Croatia.[111-113] However, this topic was not investigated in any previous studies in Kuwait.[22] Therefore, the author conducted a study that was published in 2017 to determine the attitudes of medical and pharmacy students towards physician-pharmacist collaboration in Kuwait.[22] This article is explored further in Chapter 5.

Many academic institutions in developed countries have implemented IPE into the education and training of health students to prepare them for collaborative practice.[114-116] However, IPE is still in its early stages of adoption and implementation in many countries, especially in developing regions.[117] Substantial barriers to IPE implementation exist such as absence of institutional support, curricular/teaching challenges, restricted resources, health students' disparities in their learning needs and lack of student/faculty interest in IPE.[117, 118] Professional stereotypes and variations in student attitudes towards IPE have also been among the challenging obstacles that influenced the effective implementation of IPE.[119-121]

A review of the literature revealed some studies that have assessed the attitudes of faculty members towards IPE and healthcare teams in some developed countries,[122, 123] and Middle Eastern countries.[124, 125] Several studies have also investigated the attitudes of health students towards IPE and collaborative practice in developed countries,[120, 126-129] and some Middle Eastern countries.[130-132] However, there were no previous studies that assessed the attitudes of faculty members and health students towards IPE in Kuwait.[23, 24]

In the health faculties at Kuwait University HSC, most of health students' learning is delivered using a uniprofessional educational model.[24] In uniprofessional education, students learn with peers from the same profession.[133] The HSC has a future plan to develop an IPE curriculum. The assessment of the attitudes of health faculty members and students towards IPE and healthcare teams was important to enlighten the IPE curricular plan. Therefore, the author conducted two studies to address these objectives.[23, 24] The first study that was published in 2021 explored the attitudes of faculty members towards IPE and collaborative practice, their training needs and perceived barriers to IPE implementation.[23] The second study that was published in 2022 explored the attitudes of health sciences students towards IPE and collaborative practice.[24] These studies are described in more detail in Chapter 5.

1.5.4 Simulation-based education for pharmacists

Simulation is an instructional method that imitates or amplifies real clinical experiences with controlled learning experiences with the aim to evoke or reproduce elements of the real world in an interactive way.[134] It involves recreating patient care scenarios in a safe

and controlled learning environment for learning, assessment and feedback.[135, 136] Simulation training sessions are planned to achieve predetermined learning outcomes.[137] They are typically organised to embrace a pre-briefing to orient students, immersion of simulation and a subsequent facilitated debriefing.[136, 137] Simulation allows learners to apply critical thinking skills in resolving problems, resulting in effective learning, as well as acquisition and retention of knowledge.[138, 139]

Several methods/techniques have been used in SBE such as use of SPs, integrated simulators (mannequins controlled by computers), and part-task trainers (full/partial mannequin to train on procedural skills).[140-142] Role-playing is perhaps the most commonly used form of simulation.[78] There are two broad classifications of patient simulations: the human patient simulation (HPS) and SP simulation.[143, 144] The HPS involves the use of sophisticated computer-aided mannequins or part-task trainers.[140-143] The SPs are persons who have been trained to portray a patient's disease in a standardised way.[140, 144] They can be paid actors, community volunteers, student peers or faculty members.[144] Simulation experiences must mirror actual practice experiences, so learners suspend disbelief and interact with an SP and/or healthcare professionals *as-if* they are in a real patient care scenario.[145] The fidelity of simulation describes the level of realism of the simulation experience or precision of the system used to recreate actual practice experience.[142, 145]

Simulation has been increasingly employed in healthcare professionals' training on clinical skills, including both technical and nontechnical skills.[135, 140, 145] Technical skills

describe the skills required for establishing medical diagnosis, management and physical procedures.[146] Non-technical skills involve behavioural features of personal and team performance such as communication, decision-making and teamwork skills.[146, 147] Simulation has been effectively implemented in training healthcare professionals on teamwork and interprofessional communication, and is a recommended learning strategy in IPE.[145, 148-151] However, some barriers might hinder the implementation of SBE such as the need for extensive resources to establish specialised simulation facilities, need for training of faculty members in relation to simulation, and faculty members' limited time to use this method.[135, 142, 143] The use of SPs can also be challenging due to the expense, effort and time needed for their preparation.[140, 144]

Simulation has been used to prepare pharmacy students for pharmacy practice such as training on medications dispensing and patient counselling.[139, 152] The HPS has been implemented in developing students' knowledge and skills on different topics such as pharmacotherapy,[153, 154] physical assessment,[154, 155] teamwork,[150, 154] and management of medical emergencies.[156] The SPs have been mainly used for development of communication, team-based skills and direct patient care skills.[144, 151, 157]

Most evidence about simulation use in the education and training of healthcare professionals comes from western education systems.[25] There were no previous studies describing the use of simulation in pharmacy education in Middle Eastern countries, including Kuwait.[25] While undertaking the MSc in Diabetes Care and Education, the author completed a module entitled Clinical Skills and Simulation for Education and

Practice. Simulation was new to the educational practice of the healthcare professionals in Kuwait.[25] As a result, the author wrote an article in collaboration with the leads of that module to describe the early perceptions of healthcare professionals about simulation in Kuwait in 2015.[25] Subsequently, the author designed and implemented simulation-based sessions to train PharmD students on team approach to patient care.[26] In 2020, the author described this educational initiative in "Insights" article in the Clinical Teacher Journal.[26] These publications will be part of the scope of Chapter 5.

1.5.5 Continuing professional development and continuing education of pharmacists

Continuing professional development (CPD) and continuing education (CE) have been used by pharmacists to develop, update and maintain the required knowledge and skills for their practice throughout their careers.[158] In CE activities, pharmacists often attend educational or training events and record the number of hours of the education that they received.[158] On the other hand, CPD represents a cyclical process in which the individual reflects on their learning needs, develops personal plan for the required learning followed by implementation of learning with subsequent evaluation.[159]

Although pharmacists' enrolment in, and completion of CE/CPD activities is a requirement for maintaining pharmacy registration/license in some countries, this is still not required in other countries including Kuwait.[158, 159] However, pharmacy CE activities are occasionally conducted by the Faculty of Pharmacy, Kuwait Pharmaceutical Association and medical companies. The author had an experience of implementing CE

activity for hospital pharmacists in Kuwait.[10] The article describing that initiative was the first report from Kuwait about CE in pharmacy.[10]

1.6 Purpose of research and structure of thesis

The research interests of the author focussed on areas in pharmacy practice and education that she felt would require development to enhance PC practice. During her academic and research journey, the author has been influenced by collaboration with pioneer academics from Scotland and the US. This promoted her to embed some innovative educational strategies into the education and training of pharmacy students in Kuwait. The selected sets of the author's publications that are covered in this thesis can be arranged into the following themes:

1. Pharmaceutical care: exploring attitudes, barriers to implementation and current practices.
2. Pharmaceutical care: from classroom to clinical practice.
3. Interprofessional education and simulation-based education for integrating collaborative working to support pharmaceutical care practice.

The first step to implementing any change must involve conducting users' requirements analysis and needs assessment. The author's publications set the scene on these topics by assessing stakeholders' attitudes, preparedness level and perceived barriers. This has initiated dialogues around these topics to enable future development and implementation of these initiatives.

1.7 Aim and objectives

1.7.1 Aim of thesis

The aim of this thesis is to describe the author's contribution to the pharmacy literature from 2013 to 2021, and how these publications have impacted the author's academic and research journey and her attempts to aid in the development of collaborative, practice-ready pharmacists in Kuwait.

1.7.2 Objectives

The following objectives were devised based on those addressed in each publication/set of related publications included in this thesis:

1) To explore the attitudes of pharmacy students and practitioners towards PC practice, their preparedness levels to perform PC competencies and perceived barriers to implementation of PC services in Kuwait (key publications 1 and 2).
2) To explore PN practices in hospitals, role of pharmacists in providing PN and the barriers to provision of PC services in this specialised area of pharmacy practice (key publications 3 and 4).
3) To describe the various roles that pharmacists can have in relation to PN therapy in light of the published literature (key publication 5).
4) To pilot the use of active learning methods in pharmacy education and determine students' views (key publication 6).
5) To describe the available literature about development, applications and challenges of CBE in pharmacy (key publications 7 and 8).

6) To determine the attitudes of medical and pharmacy students towards physician-pharmacist collaboration and the barriers to physician-pharmacist collaboration (key publication 9).
7) To explore the attitudes of Kuwait University HSC faculty members and students towards IPE and collaborative practice and identify the barriers to IPE implementation (key publications 10 and 11).
8) To gauge the early perceptions of healthcare professionals about the use of simulation and to describe the use of simulation for training pharmacy students on team-based patient care (key publications 12 and 13).

The structure of the thesis and how the above objectives will be explored in the next chapters are outlined in Table 1.1. Figure 1.1 describes the author's research interests and the list of key publications in relation to the described themes. The publications presented in this thesis are organised into two main research areas: PC research and pharmacy education research. After joining her work at the Faculty of Pharmacy, the author realised that the concept of PC was well integrated in the pharmacy curriculum. However, the author perceived a gap between what the students learn at the Faculty and what pharmacists were actually practising in the healthcare settings. Therefore, the author initially explored areas related to PC practice in Kuwait. These included studies exploring attitudes of pharmacy students and hospital pharmacists towards PC and their perceived barriers to its implementation.[14, 15] Afterwards, the author investigated PN as a special area of pharmacy practice that would benefit from expanding the implementation of PC

services in hospitals.[16-18] These publications are covered under the first theme which is presented in Chapter 3.

The early PC research enlightened other elements of the author's research journey which were directed to pharmacy education. The barriers to PC implementation in practice, outlined a gap in the use of active and simulated learning strategies to enhance the competence needed for its adoption.[14, 15] Furthermore, the initial PC research (both the studies exploring the attitudes towards PC and those investigating PN practices at hospitals) exposed the weak interprofessional collaboration among healthcare professionals.[14-17] Therefore, initially, the author piloted the use of active learning methods to train pharmacy students on the competencies needed for patient counselling.[19] At that time, the Faculty of Pharmacy was undergoing an educational reform to change the BPharm programme to PharmD programme. Thus, it was pertinent to investigate educational models and instructional techniques that can support the new PharmD programme and development of pharmacy students to become competent PC practitioners. The second theme describes how to develop pharmacy education to enhance PC adoption in practice and covers the publications presented in Chapter 4. These include the publication describing the use of active learning methods in pharmacy education and the two publications on CBPE which was adopted in the newly developed PharmD programme.[19-21] Additionally, the author embarked on research to determine the attitudes of medical and pharmacy students towards physician-pharmacist collaboration, and to explore the concepts of IPE and SBE to integrate collaborative working to support PC

practice.[22-26] The author's publications in relation to these topics are covered under the third theme which is discussed in Chapter 5.

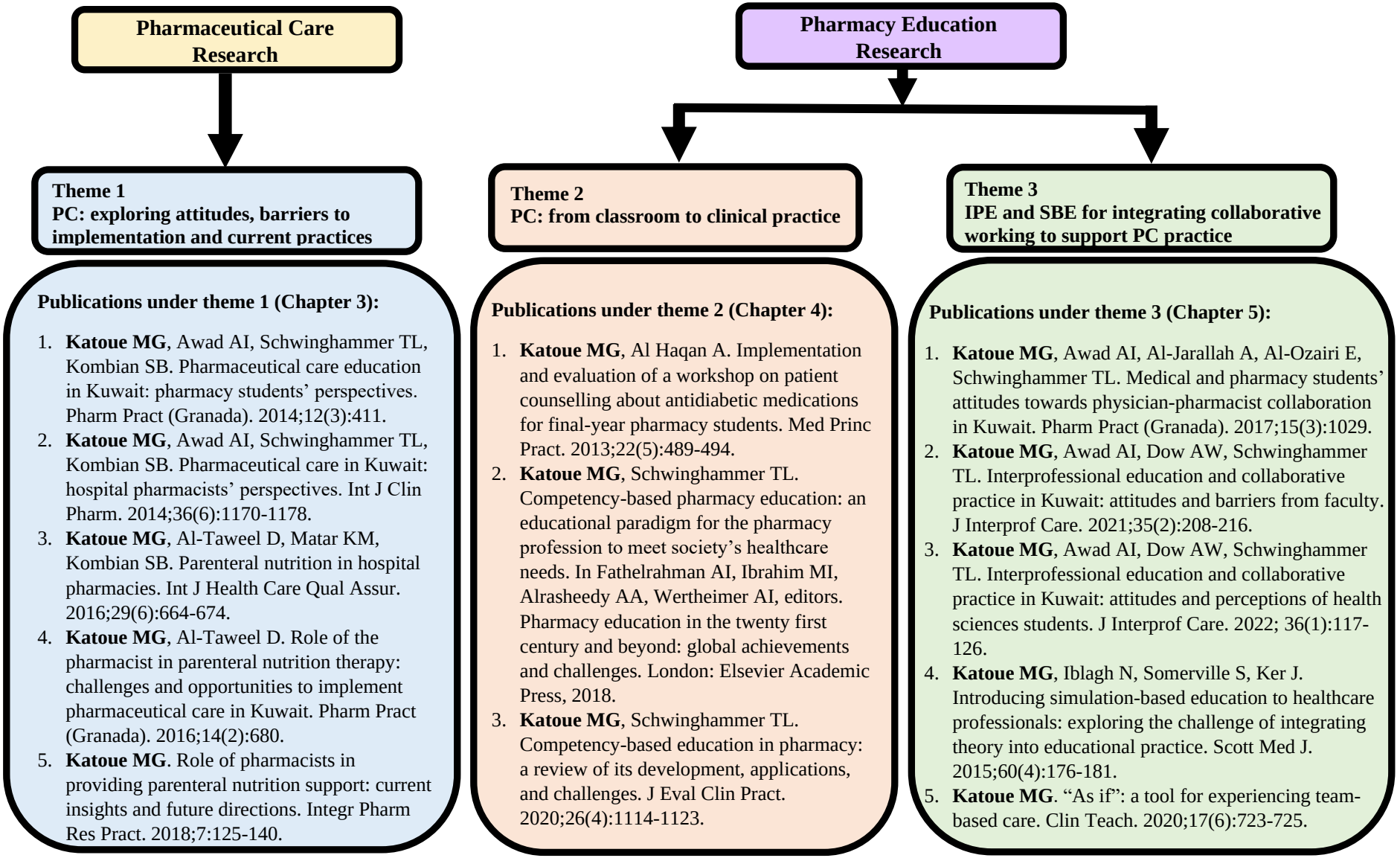
The author was the first and corresponding author for all the publications included in this thesis. In two of the publications, the researcher was the sole author.[18, 26] In multi-authorship papers, the researcher's input into each publication, and the roles of the researcher and co-authors in these publications are outlined in Appendix 2.

Table 1.1: The structure of thesis.

	Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6
Scope	**Introduction**	**Methods**	**Theme 1:** PC: exploring attitudes, barriers to implementation and current practices.	**Theme 2:** PC: from classroom to clinical practice.	**Theme 3:** IPE and SBE for integrating collaborative working to support PC practice.	**Conclusions**
Content	Description of the research context and author's professional and academic role. Definitions of basic concepts and a literature review on the research topics. Aim and objectives.	Description of quantitative, and qualitative methods, descriptive studies and literature reviews undertaken. Rationale for the selected methods in the publications. The pros and cons of each method.	Objectives 1, 2 and 3.	Objectives 4 and 5.	Objectives 6, 7 and 8.	General conclusions and description of the limitations of research. Recommendations to support PC provision in Kuwait.

Abbreviations: pharmaceutical care (PC), Interprofessional education (IPE), Simulation-based education (SBE).

Figure 1.1: The described themes in this thesis and a list of the key publications under each theme.



Chapter 2: Methods

2.1 Overview of the settings and research methods used in the publications

The publications described in this thesis include research articles and other scholar outputs on topics related to pharmacy practice and pharmacy/medical education. In pharmacy practice research, data were collected from pharmacists practising in governmental hospitals either by survey or interview research methods.[15-17] In the educational research publications, data were collected using surveys from selected student cohorts from the Faculty of Pharmacy,[14] Faculties of Medicine and Pharmacy,[22] and from HSC faculty members and health sciences students.[23, 24] The publications also include three descriptive papers on educational initiatives: one article describing an interactive workshop for final year students enrolled in the B Pharm programme,[19] an article reporting the experiences of healthcare professionals who were attending a simulation module,[25] and an article describing simulation-based sessions for PharmD students.[26] The remaining publications are literature reviews on PN therapy,[18] and CBPE.[20, 21]

The ethical approvals for conducting the described research studies were obtained from the relevant Institutional Review Board or research ethics committee depending on the study setting.[14-17, 22-25] Participants in these studies provided written consents to participate in the study in question and were assured that the responses they provided were anonymous and confidential.

Pharmacy practice research is usually conducted by quantitative (survey) and/or qualitative (interviews) methods. Quantitative research aims to test a hypothesis,

investigate frequencies of events and assess associations among variables, thereby answering questions like "what", "how much" and "why".[160, 161] Qualitative research focusses on exploring people's thoughts and behaviour by addressing questions such as "how" and "why".[160-162] The following sections outline the methods that were used in the publications.

2.2 Quantitative methods (surveys)

Five out of the 13 publications included in this thesis were survey-based studies.[14, 15, 22-24] The term survey generally refers to selecting an adequate sample of people from a pre-determined population of interest, with subsequent collection of data from this sample.[163] The survey instrument is the questions or questionnaire used for data collection.[164] These can be either administered in person, by mail, by telephone, by email, by Internet-based means, or administered using a combination of these means.[165] This method has been used in pharmacy practice research to address different research questions in a range of populations and settings such as evaluation of pharmaceutical services.[166, 167] Survey research studies are mostly descriptive cross-sectional studies that are conducted to describe the opinions and/or practices of one population at a single point in time.[166] Descriptive research aims to observe, collect information on certain phenomena, or examine a situation, investigate the significant associated factors with that situation and describe these associations.[163]

2.2.1 Study population and sampling

In survey research, data are seldom collected from every individual of a population.[168] Rather, sampling from the target population can address the research questions, and save time and costs.[168] A random sample is a preferred sampling method in survey research as it permits the findings to be reliably generalised to the target population.[166, 168] Other nonprobability sampling methods such as convenience, snowball and judgmental (purposive) sampling methods can also be used in survey-based studies.[163, 166, 169, 170] Although random sampling is preferred but it may not be applicable to all types of survey-based studies, for example when the study is evaluating a particular service or an educational intervention or when the study population is small.[166] In these instances, the researchers target the survey to those individuals who are involved in the service/intervention or select everyone within a small population under study.[171, 172] In judgmental (purposive) sampling, a specific sample is selected based on what the researcher believes regarding who can be most informative to achieve the study objectives.[163] Total population sampling is a type of purposive sampling method used by researchers when the size of the population is small whereby they include the entire population that shares a particular set of characteristics.[171] In education related research studies, researchers typically target specific student cohorts to address their research questions.[112, 173, 174] Specific individuals are thus targeted and selected, and the sample size is determined depending on the purpose of the survey.[168] Total population sampling was used in all the survey-based studies included in this thesis.[14, 15, 22-24] These studies will be outlined in detail in Chapters 3 and 5.

The generalisability (external validity) of survey results represents the extent to which these results can be applicable to individuals beyond the sample.[164, 170] The appropriateness of sampling procedure, adequacy of sample size, validity of the survey instrument and a high response rate (response rate is calculated by dividing the number of respondents by the number of individuals in the sample) are all factors that can establish confidence in generalising the results to the target population.[164, 168, 169]

2.2.2 Survey design and administration

Researchers who conduct survey research commonly develop their own survey instrument, creating their own questions to address the study objectives.[164] In these situations, they must address important factors including the validity and reliability of the individual survey items and the whole instrument from scratch.[164] The questionnaire must be carefully designed and piloted to minimise bias in results.[163, 172] An essential prerequisite of development of a questionnaire is to ensure that the goal of the questionnaire has been clearly defined.[172] Then, the researcher must identify the type of questions that the questionnaire will address and determine that the questionnaire is the best method to provide the necessary answers from the target sample.[172, 175, 176] It is also important to decide the format in which the questionnaire will be administered (self-administered or administered by a researcher).[163, 177]

After deciding the research questions, the topics of interest must be carefully planned and clearly linked to these questions.[163] Experts in the field, peers and members of the target population can be invited to participate in the questionnaire design process.[163] A

qualitative research method such as focus groups can be used to explore the research area and issues to be tackled in the questionnaire, especially when sufficient details are not available in the literature.[175, 176]

Development of a questionnaire with good psychometric properties requires expertise and considerable investment in the time and effort to ensure that the items adequately assess the concept of interest.[172, 177] In particular, development of instruments such as attitude scales can be a costly and lengthy process.[163, 164] Therefore, it is advised to use an existing, validated survey instrument whenever possible.[172, 175] Once the topic of interest has been decided, the next step is to conduct a thorough literature review to identify any existing, previously validated questionnaire that can address the research questions.[163, 177] If there is no validated questionnaire available, researchers must construct their own.[175, 177]

A step-by-step approach to designing a perception survey has been described.[176] The first step is to define the survey objectives, identify the target population and decide how the findings will be used.[176] The second step is drafting the survey questions.[176] The questions must be simple and clear and the respondents must have a shared understanding of their meanings.[176] The survey items can either be closed- or open-ended questions.[175, 177] Close-ended questions provide respondents a limited set of response options, whereas open-ended questions help researchers to obtain more detailed information about a specific domain.[175, 177] Careful attention must be giving to formulating the items to ensure clarity of expression so that research participants can easily respond.[164] The items must be simple, short, to the point, and written using a clear language that is suitable for the

educational level of the intended respondents.[172, 175, 177] The researcher must avoid the use of leading questions and items that combine more than one issue (double-barreled items).[172, 177] The researcher must pay attention to the general layout of the questionnaire as it should be well presented with the inclusion of clear instructions and headings to make it easy to complete.[163, 175] The researcher must also prepare a cover letter that outlines the purpose of the survey, name and contact information of researcher, role of participants, how the provided information will be used, how the anonymity will be ensured and an informed consent to participate in the study.[163, 175, 176] The third step involves piloting and re-adjustment of the questionnaire through its administration on a small sample of the target population.[176] This can help researchers to check if the respondents understand the questions and instructions properly, identify problems in the questionnaire design and adjust the questionnaire accordingly.[163, 172, 177] The fourth step is the selection of respondents, the sampling method and data collection method.[176] The fifth step involves survey administration and collecting responses.[176] This is followed by analysis of the results and assessment of the validity and reliability of the survey.[172, 177] A well-designed questionnaire is one that is simple, suitable for the intended use, acceptable to respondents and must demonstrate the psychometric properties of validity (precise measurement of the concept) and reliability (consistent measurements over time) as described below.[163]

The validity of a survey instrument is the degree to which it measures what it is intended to measure and to which the questions gather precise information pertinent to the study objectives.[164, 168, 172, 175] For the validation process, the instrument is often tested among a sample of the population for which it is to be administered to guarantee that the responses

actually reflect the elements or attributes of interest.[164] This initially starts by assessing the survey's face validity which evaluates the ability of the instrument to collect precisely and effectively the information required.[164] Face validity indicates that each question is meaningful to someone who knows the field that the survey is trying to measure and it is demonstrated thorough a review by experts in the field.[172] This is often performed by asking members from the same research team, particularly experienced researchers to provide comments and suggestions on the instrument to identify immediate problems and enhance its validity.[164] Content validity describes the extent to which an instrument maps all the relevant issues.[164] This requires an organised and systematic review of the instrument to ensure that it captures the important aspects of what it is trying to measure using appropriate scales and to check if the content of the questionnaire seems valid to experts in the field.[172] Other tests of validity include criterion validity which reflects the degree to which the instrument or questions correlate with other measures of the same variable.[164] Criterion validity is evaluated based on responses to the instrument and can be demonstrated by comparing the results with established methods of collecting the same data.[164, 172] Lastly, construct validity attempts to evaluate the ability of an instrument to actually measure what it is trying to measure, especially when that intended measure is a construct or an abstract concept.[164, 172] To establish construct validity, the instrument must embrace questions that can easily be answered and can provide a classification that correlates with the elements of a theoretical construct.[164] Statistical procedures such as factor analysis have been used in the development and construct validation of survey instruments.[164] It is important to note that surveys based on self-reporting may not provide precise information on some variables and could be influenced by social desirability bias

or misinterpretation.[164, 170] Therefore, an essential aspect of the validation process of an instrument is pretesting to check if the questions are interpreted by respondents as intended and to assess the degree of response bias.[163, 164, 168] Self-reported data have also been validated by comparing responses with data on the same variables gathered from alternative sources.[164]

The reliability, on the other hand, of a survey instrument or questions refers to the degree to which the results are repeatable, reproducible or internally consistent.[164, 168, 170] A reliable questionnaire measures the variable or variables consistently from repeated samples and diverse researchers over time.[168, 175] Cronbach's alpha is a statistical measure (between 0 and l) commonly used by researchers to check for internal consistency (internal reliability of questions).[164, 167, 172] Values that are not less than 0.7 are generally considered as acceptable.[164] Factors leading to poor reliability include unclarity of question wording, lack of standardisation of questionnaire administration by different researchers, inconsistent interpretation of questions or inability of respondents to provide precise information, resulting in estimates or gusses.[164] Questions which are not carefully formulated can lead to unreliable findings and this issue can be addressed by spotting these questions.[164] The reliability of survey responses can also be evaluated by comparison with similar data collected from other sources.[164]

As explained above, using a previously developed and validated questionnaire is considered an efficient approach.[172, 175] In pharmacy practice research literature, researchers have applied validated instruments to address their own research

objectives.[164, 166] This approach would save researchers time and extensive work to ensure the validity and reliability of structurally complex instruments such as those assessing individuals' attitudes.[164]

Attitude can be defined as a propensity to act or react in a definite way in specific situations or in reaction to specific stimuli.[178] Attitudinal scales often consist of a series of statements to which respondents are requested to specify their level of agreement or disagreement.[167] The questionnaires usually include a measurement model (i.e., scale structure and scoring system) that respondents use to indicate their responses to.[168] The development of survey instruments that can assess attitudes is a challenging process because the attitudes of individuals to any topic may be complex and the instrument must mirror the strength of their feelings.[163, 164] Therefore, it is practical to use an existing instrument if a suitable one is available rather than to develop a new one.[164]

All the survey-based studies described in this thesis were based on previously validated instruments.[14, 15, 22-24] In the studies assessing the attitudes of pharmacy students and pharmacists towards PC, the study questionnaire included validated survey instruments that were developed and used in the US.[14, 15] These included the Standard Pharmaceutical Care Attitude Survey (PCAS),[179, 180] and a reduced version of the Perceptions of Preparedness to Provide Pharmaceutical Care (PREP) survey.[173, 174] In the study assessing the attitudes of medical and pharmacy students towards physician-pharmacist collaboration,[22] the questionnaire encompassed the Scale of Attitudes Towards Physician-Pharmacist Collaboration (SATP^{2}C) which was developed in the US.[111, 112] In the studies

assessing the attitudes of Kuwait University HSC faculty members and students towards IPE, the questionnaires were based on validated survey instruments that were developed in the UK and US.[23, 24] These included the Attitudes Towards Health Care Teams Scale (ATHCTS),[181] the Readiness for Interprofessional Learning Scale (RIPLS),[119, 182] and a reduced version of an instrument that assesses the attitudes towards interprofessional learning in the academic setting.[183] All these adopted instruments were used in the studies in the language they were originally designed in (English language).[14, 15, 22-24]

The questionnaires used in these studies collected demographic characteristics from respondents.[14, 15, 22-24] They also included additional sections that were developed to assess respondents' views on other aspects related to the study. For example, the questionnaire used in the PC studies included a section to evaluate respondents' opinions about a number of potential barriers to PC provision.[14, 15] The questionnaire used in the study assessing students' attitudes towards physician-pharmacist collaboration included a section to evaluate respondents' views on the possible barriers to collaboration.[22] The questionnaire developed for the study assessing the attitudes of HSC faculty members towards IPE included questions to investigate staff training needs and their views on a list of barriers to IPE implementation.[23] These added sections were developed based on literature reviews. The literature is a valuable source to identify relevant issues and/or variables that can be used for survey development.[164] Some researchers have incorporated open questions in structured instruments to allow respondents to report matters from their own prespectives.[164, 168] In the studies assessing students' attitudes towards physician-pharmacist collaboration and the attitudes of HSC faculty member towards IPE, the

questionnaires included open-ended questions to provide participants an opportunity to report additional barriers to the study topic.[22, 23]

Prior to their administration, the whole questionnaires that were used in these studies (including both the sections adapted from the validated instruments and the developed sections) were piloted to check the linguistic and cultural validity by the targeted populations in Kuwait as the tools used were validated in other countries.[14, 15, 22-24] These tools were tested for content, readability and comprehension with 10-15 individuals before distribution, and modifications were made as needed.[14, 15, 22-24] As indicated above, pretesting can help identify potential problems related to reliability and validity prior to data collection.[163, 164, 168] For the administration of the questionnaires, the selected sample was approached and paper copies of the questionnaires were distributed by the author, completed anonymously by participants and then collected.[14, 15, 22-24]

2.2.3 Quantitative data analysis

Statistical analysis of data was performed using the Statistical Package for Social Sciences (IBM SPSS, Armonk, NY). As commonly documented in pharmacy practice research, the statistical analysis of survey data often includes summary statistics (frequency data, means and standard deviation for normally distributed data, and median and interquartile range (IQR) for non-normally distributed data) to present findings of the descriptive studies.[164] Non-parametric statistical tests are frequently used for data analysis in pharmacy research surveys.[164] In the survey-based studies presented in this thesis, data were analysed by using the Mann-Whitney test to evaluate the differences between two

groups of the independent variables and the Kruskal-Wallis test to evaluate the differences between three or more groups of independent variables.[14, 15, 22-24] Statistical significance was accepted at a p value of <0.05.[14, 15, 22-24] It is also common in these studies to compare responses of different sample subgroups or to design studies with the intent of comparing the views or practices of two or more population groups.[166] This was performed during data analysis in the presented survey-based studies.[14, 15, 22-24] The details of these studies will be outlined in Chapters 3 and 5.

2.2.4 Advantages and disadvantages of surveys

The main advantages of survey research include its ability to collect data from a representative sample and thus can be generalisable to a population.[163] Surveys are also a relatively fast and inexpensive method of gathering a big amount of data from a wide population.[163, 166]

The disadvantages of this approach include lack of depth or sufficient details on a topic.[163] There might be some difficulties in obtaining a high response rate to a survey.[163, 169] Potential nonresponse bias can also affect the validity of the survey findings.[165, 166, 169] Nonresponse bias arises when data are not gathered from each potential respondent of the sample.[165, 169] Non-responders include individuals who are unwilling to participate, those unable to provide the required information and those who are unable to respond (e.g. due to disability or illiteracy).[166] The lower the response rate, the higher the chance that the respondents are self-selected rather than randomly selected and the greater the probability of response bias or nonresponse error.[168, 169] Achieving a high response rate decreases

nonresponse bias and increases the feasibility to generalise the results to the target population.[169] Researchers have been employing several strategies to secure high response rates.[166] Examples include repeat mailings, telephone calls, follow-up reminders, proper timing of contacts, use of incentives, pre-contacting recipients and careful attention to the presentation of the questionnaires and the content of the approach letters.[166, 172, 176] The following strategies: approaching participants personally to explain the purpose of the study and encourage their participation, and the use of email reminders were used in the survey-based studies presented in this thesis.[14, 15, 22-24] Missing values are another frequently encountered issue in survey data.[166] Moreover, surveys constructed on the basis of self-reporting may not collect accurate information on some variables.[164]

2.3 Qualitative methods (interviews)

Qualitative research aims to understand views, attitudes, experiences and behaviours from the viewpoints of research participants or to expose the unknown aspects of a specific topic.[160, 162, 184] Several methods have been used to collect data in qualitative research including in-depth interviews, focus groups and observation.[162, 184] Qualitative research has increasingly been applied in health services research including research related to the evaluation of pharmaceutical services.[160, 162]

As stated in Chapter 1, the author investigated PN practices at Kuwait hospitals. The objectives of the PN studies were to describe PN practices and explore role of the pharmacist in PN therapy in hospitals.[16, 17] The number of key informants (TPN head pharmacists) for the two PN studies were only seven participants.[16, 17] Therefore, a

decision was made to explore their practices and views in relation to PN using qualitative interviews.[16, 17]

2.3.1 Sampling in qualitative research

Different sampling methods have been used in qualitative research including purposive, snowball, representative, convenience, theoretical samples, or a combination of these methods.[160, 184] Purposive sampling is the most commonly used sampling technique in qualitative studies.[160] It involves deliberate recruitment of individuals who are likely to provide the information that answers the research questions.[160-162] The research questions, potential available purposive sample and data saturation determine the sample size.[185] Data saturation occurs when data collection is stopped when no new themes emerge from data.[161, 184] In the two PN studies, purposive sampling was used to interview the head TPN pharmacists at all the hospitals that provide TPN preparation services in Kuwait.[16, 17]

2.3.2 Types of interviews and development of interview guide

Qualitative interviews, including structured, semi-structured and in-depth interviews have been used in studies evaluating pharmacy services.[167] Structured interviews involve the administration of structured questionnaires by trained interviewers in a standardised manner.[186] In Semi-structured and in-depth interviews, information is gathered from respondents while providing them with the opportunity to raise issues of relevance from their own perspectives.[167]

The interview guide is the instrument used by the researcher to guide the development of qualitative interviews and to guarantee that all relevant issues have been covered.[187] When developing the interview guides, two important issues must be considered, the content and degree to which it is structured.[160] The topics of the interview guide can originate from different sources such as literature reviews, expert knowledge, or theory.[187] When previous research had been undertaken on the topic, the identified issues could be used to inform the interview guide in subsequent research or the aim of the new research study could be to conduct a more detailed exploration of these issues.[160]

The interview guide can be either unstructured or semi-structured.[160] In unstructured interviews, the interview guide includes a limited number of topic headings that are discussed according to the issues of relevance to respondents.[160] In semi-structured interviews, the information is collected on the basis of a loose structure using open-ended questions that broadly define the topic.[186] This provides the opportunity for respondents to express their views and researchers to collect specific information relating to the topic.[160] While conducting qualitative research, the study objectives are usually exploratory.[160] Therefore, care must be taken to use open-ended, non-leading questions during the interviews to allow participants to raise the issues that they feel are central to the topic.[160] There are different types of questions that can be asked during qualitative interviews.[188] These include questions exploring behaviour or experience, opinions or beliefs, feelings, sensory experiences, knowledge and those investigating background or demographic characteristics.[188] The order in which the questions are asked will differ, as

well as the probing questions that are designed to further explore the interviewees' meanings.[186, 189]

To prepare semi-structured interview schedules, the researchers must first identify the phenomenon of interest and translate that into the research question or aim.[189] They must also be familiar with their overall research study approach.[189] A three step-wise approach to writing semi-structured interview schedules that are based on events has been proposed.[189] The first step is to compose questions around a core event or series of events that demonstrate the phenomenon of interest.[189] The second step is ordering the questions to generate an intuitive conversational structure by which the interview can flow like a natural conversation.[189] This can be achieved by structuring the schedule into three parts: introduction, exploring the core phenomenon and final reflections.[189] The last step involves refinement of the schedule through a series of review and by piloting the schedule with people who are similar to the prospective interviewees.[189]

The study that explored PN practices at hospital pharmacies and the study that investigated the role of pharmacists in PN therapy were conducted using face-to-face semi-structured interviews with the TPN pharmacists.[16, 17] In these studies, data were collected from TPN pharmacists using an interview guide that was developed based on a literature review and then reviewed by the research team to ensure its face/content validity.[16, 17] The interview guide included questions to gather pharmacists' demographic details and practice site characteristics.[16, 17] The instrument used in the first study included questions to obtain background information about the PN services at hospitals, PN

preparation practices in relation to ordering, compounding, storage, labelling, quality controls, and existence of NST and PN guidelines/protocols.[16] The interview guide used in the second study was designed to gain an in-depth understanding about the role of pharmacists in TPN services, opinions on team approach to patient care, sources of information on PN therapy, views on the barriers to PC provision and suggestions on how to enhance pharmacists' role in relation to this service.[17] Further details on these studies are presented in Chapter 3.

2.3.3 Qualitative data analysis

The dialogue from qualitative interviews is audio-recorded and then transcribed verbatim.[160, 184] For the analysis of data obtained from the study which described PN practices at hospitals, content analysis was conducted.[16] This process involves performing a systematic examination of transcripts in which the textual data are explored inductively and then coded and classified to generate categories.[161, 162, 185] Qualitative research does not aim to quantify participants' responses but some researches have applied that approach to describe the proportions of respondents who expressed similar or opposing opinions.[160] Pharmacists' responses regarding PN practices were quantified because the study aimed to describe PN practices at hospitals of Kuwait.[16]

In the second study which explored pharmacists' role in PN therapy, a phenomenological approach was implemented as the analytical framework for the research.[17] Phenomenology aims to provide an understanding of the subjective experiences of individuals.[161] Data analysis was inductive which means that themes emerged from data

collected.[161, 162] Thematic analysis of the data was performed using the five-stage framework approach.[185, 190] The stages of this approach include familiarisation with the transcribed data, identification of a thematic framework, applying the thematic framework to the data (indexing), charting the data under the appropriate themes and sub-themes, followed by a mapping and interpretation stage to explore associations between the identified themes and explain the findings.[185, 190] Results were presented with the aid of illustrative quotes from the interviews.[17]

2.3.4 Advantages and disadvantages of qualitative research

Qualitative research can offer insights into dimensions that quantitative research is unable to explore such as understanding social phenomena and reasons behind individuals' behaviours or actions.[162, 184] It generates rich data by allowing the participants to raise the issues they feel important.[161] The qualitative approach has also been used to describe experiences of healthcare professionals about different aspects of professional practice.[160]

The general limitation of qualitative research is that the results are not intended to be generalisable.[160, 161, 184, 191] Reproducibility (reliability) of findings is also not intended in qualitative studies because they represent a specific context.[160, 191] However, findings may be transferable to other contexts if they were found to be appropriate/applicable to these settings.[161] Some elements of quality can be applied to enhance the confidence in the findings of qualitative research studies such as considering the adequacy of sampling, obtaining a high level of saturation and applying specific measures to establish

rigour/trustworthiness as described next.[191-196] Qualitative research requires extensive work; in particular, transcription of interviews is a time-consuming process.[186]

Rigour of qualitative research is a means to establish confidence in the research findings.[195] This depends on a systematic and self-conscious research design, data collection, interpretation and reporting.[191] Lincoln and Guba[194] described criteria of rigour in their model of trustworthiness of qualitative research that addresses four elements: credibility, dependability, transferability and confirmability.

Credibility (truth-value) which corresponds to internal validity in quantitative research, is a way that enables others to identify the experiences contained within the study through the interpretation of the experiences of participants.[194, 195] Examples of strategies that can be used to establish the credibility of qualitative research include triangulation, member checking, peer debriefing or peer examination, reflexivity, spending prolonged and varied time with participants and using participants' words while writing the final report.[195, 196] Triangulation involves data generation using different sources, researchers or theories and often by multiple methods of data collection to address a research question.[191, 192, 196] Member checking (respondent validation) occurs when the researchers return data, analytic categories, researchers' interpretations, and/or conclusions to the participants to check if they regard these provisional findings as accurate representations of their experiences.[191, 192, 195, 196] Peer debriefing involves asking an experienced, disinterested colleague to examine different aspects of the research process and help the researcher to reflect on biases affecting these aspects.[196] Peer examination refers to requesting from

peers or consultants experienced in the qualitative analysis process to review and discuss the coding process.[195] Multiple coding is the process by which independent, skilled qualitative researchers cross check the coding strategies and data interpretation to refine the coding frames and enhance the reliability of qualitative data analysis.[191, 192] Reflexivity provides qualitative researchers with a way to recognise the inherent bias that the researcher might introduce to the research and can be a useful technique to establish all elements of trustworthiness.[193, 196]

Transferability (applicability), equivalent to external validity in quantitative research, reflects the feasibility to transfer research methods or findings from one sample to another, or the extent to which the results of a particular inquiry have applicability with other subjects/participants or in other contexts.[194, 195] Thick contextual description is a technique used to establish transferability of qualitative studies by providing a dense description of the setting including geographic boundaries of the study, research participants and their demographics, quotes and data interpretation.[195, 196]

Dependability (consistency), similar to reliability in quantitative research, is evident when another researcher can follow the decision trail employed by the researcher.[194, 195] External audit is a technique used to establish the dependability of a study through examining the process by which the research has been conducted by an auditor who is experienced in the topic and method used to explore it.[196] A key step in the external audit process is the establishment of an audit trail.[196] An audit trail is achieved by providing a detailed description of the purpose of the research, sampling method used, decisions made during

data collection, preparation for analysis, interpretation and presentation, as well as reporting the specific techniques used to determine the credibility of the data.[195, 196] Examples of other strategies used to establish dependability include describing the research methods in detail and involving peers in data analysis.[195]

Confirmability (neutrality), analogous to objectivity in quantitative terms, is achieved once credibility, transferability, and dependability have been established.[195] The researcher need to be reflective, keeping a sense of awareness and openness to the research and emergent results and must have a self-critical attitude about how one's own preconceptions might affect the research.[195] Some helpful techniques to achieve confirmability include performing external audit, taking field notes about personal feelings, insights and biases directly after each interview and making a deliberate effort to follow, rather than direct the interviews by asking the participants for clarification whenever needed.[195, 196]

Furthermore, negative case analysis (or analysis of deviant cases) which involves describing cases that contradict the findings emerging from data can help researchers to understand why these outliers exist, highlight the strengths and weaknesses of the data, ensure thoroughness and reinforce the trustworthiness of study findings.[191, 196] Other techniques for establishing trustworthiness include prolonged engagement (spending adequate time to learn about the culture of the research setting and build trust with participants) and persistent observation (recognising the aspects that are particularly important to the research question and exploring them in detail).[196]

2.4 Descriptive studies

Descriptive studies have been used in the medical education literature to describe new initiatives or educational activities such as design of curricula, instructional techniques, assessment and evaluation methods.[193] For descriptive studies to be considered as research, these studies have to incorporate some sort of comparison or evaluation.[193] This can be either through quantitative, qualitative or mixed methods research.[193] Three of the publications included in this thesis were descriptive studies, one was evaluated using quantitative research method (questionnaires),[19] while the second study involved a mixed-method evaluation.[25] The last paper consisted of a description of an educational initiative without evaluation of impact, thereby representing the lowest level of descriptive studies.[26]

In one of the studies included in this thesis, a workshop on patient counselling about antidiabetic medications that was implemented for final year pharmacy students was described.[19] The workshop included different active learning activities such as interactive lectures, small group discussion and case-based activity, and students' role-play activities to practise counselling on medications.[19] Pre- and post-workshop questionnaires were completed by students to assess the impact of the workshop on students' knowledge about medications and confidence about patient counselling.[19] This questionnaire was developed based on a literature review and reviewed by the authors and two professors with experience in medical education.[19] The knowledge questionnaire was composed of ten multiple choice questions.[19] An evaluation sheet was used to evaluate the workshop.[19] Levels 1 and 2 of the Kirkpatrick's model for evaluation of training were applied.[197] This

model describes four levels of impact as a result of training: 1) Level 1 (reaction) assesses how participants react to training and their satisfaction about it (evaluated using the evaluation sheet); 2) Level 2 (learning) evaluates the improvement in participants' knowledge, skills, attitudes or experience (evaluated using the knowledge questionnaire); 3) Level 3 (behavioural change) assesses the change in participants' behaviours; and 4) Level 4 (results) determines the impact of training on organisational performance.[197] Paired Student's *t* test was used to determine whether statistically significant differences existed between the results of the pre- and post-workshop instruments.[19] This article is described in detail in Chapter 4.

The second study described the use of simulation for clinical teaching and the early perceptions of healthcare professionals about this teaching method.[25] This pilot study was conducted during the delivery of an educational module on SBE as part of the postgraduate programme that was delivered by the University of Dundee in Kuwait.[25] Participants in this module attended face-to-face teaching sessions at the Clinical Skills Centre, DDI for four days.[25] Then, they continued with self-learning for the remaining time of the module.[25] Assessment was conducted by experiential assignments.[25]

The initial perceptions of participants were explored using a structured questionnaire composed of a series of open-ended questions.[25] The participants completed the questionnaire while rotating through five stations in the Clinical Skills Centre at DDI, each demonstrating a different simulator.[25] Participants' responses to the questionnaire were thematically analysed using the steps as described in section 2.3.3.[185, 190]

Participants' ability to demonstrate the use of simulation in teaching clinical skills was evaluated by analysing the video recordings of the teaching sessions and written reflections that they completed as part of their experiential assignments.[25] This article is discussed in more details in Chapter 5.

The third publication that encompassed a description of an educational activity was the "Insights" article that described the use of simulation to train PharmD students on team-based patient care.[26] Because of a lack of IPE at Kuwait University HSC at the time of this initiative, the author developed simulation-based sessions to allow PharmD students to understand how multiple healthcare professionals collaborate in patient care.[26] In these sessions, students prepare brief presentations on team-based approach to the care of patients with a specific disease.[26] Then, they demonstrate using role-play the roles of different members of the healthcare team in the management of that disease.[26] This paper is presented with further discussion in Chapter 5.

2.5 Literature reviews

The publications in this thesis include three published outputs that were based on literature reviews.[18, 20, 21] Literature review papers provide an inclusive overview of (whole or part of) the literature in a particular area, putting together all the relevant information in a clearly structured way and reaching to useful conclusions.[198] To write a literature review, the author performs a literature search, retrieves multiple information sources and combines the results of all relevant sources into one article.[199] There are multiple types of literature reviews.[200] The two most common ones are narrative and systematic reviews

which will be described later. Other types of literature reviews available include meta-analysis (involves a statistical analysis of the combined results of quantitative studies to provide a more precise effect of the findings), mixed studies review/mixed methods review (involves the use of any combination of methods where at least one of the elements is a literature review or the use of a combination of review approaches), rapid review (an assessment of the current knowledge about a practice or policy issue by searching and critically appraising the existing research using systematic review methods) and scoping review (an initial assessment of the possible size and scope of available research literature).[200]

Narrative literature reviews aim to assess and present comprehensive narrative syntheses of what is already published about a topic of interest.[199, 201] They can address one or more questions; then, identify and summarise published literature around the topic, and highlight research gaps or potential research directions.[201] In contrast, systematic literature reviews are based on a well-defined question; they employ detailed, rigorous and explicit search methods, and present quantitative and qualitative evaluation of the identified evidence.[199, 201] The review process is usually conducted by more than one reviewer in a systematic and consistent mode.[199] Due to the rigorous approach used in preparing systematic literature reviews, they are considered to be highly reliable evidence-based resources.[199] Narrative literature reviews have less restricted selection criteria of articles for review and information selection from primary literature can be subjective which may lead to bias.[199, 201] They are also considered to be weak evidence for making clinical decisions because they address broad issues more than focussed problems.[199]

However, narrative literature reviews can be valued contribution to the literature as they can provide description of the historical development of a clinical concept or scientific principle.[199, 201] They can also be useful educational resources for students and practitioners because they present a broad perspective about a topic in a single reference.[199] The quality of a narrative literature review can be enhanced by adopting a structured approach during literature search in line of that applied in systematic literature reviews to reduce bias in the selection of evidence.[201] Thus, it is advisable to restrict the focus on a specific topic, establish clear inclusion/exclusion criteria for literature search followed by critical assessment of the selected publications.[201]

The decision was made to conduct a narrative literature review on pharmacists' role in providing PN therapy to provide a general overview on the topic.[18] Therefore, a comprehensive search was conducted on PubMed Database (from 1975 to 2017) using different keywords related to the topic.[18] Additional resources included standards of practice related to pharmacists' role in PN and clinical guidelines from the ASPEN and American Society of Health-System Pharmacists (ASHP).[18, 50, 58] The inclusion criteria indicated that references are reviewed if the article focussed on an area of pharmacy practice related to PN therapy, and/or the article reported pharmacists' role in PN therapy and/or an intervention, assessment of pharmacist-provided PN-related services or comparison between services.[18] A step-wise review process was performed to narrow the number of articles for detailed examination.[18] The articles were excluded from the final review if they were not reporting any role of the pharmacist in PN or the full text could not be obtained.[18] The selected articles were evaluated and the findings were presented

and categorised according to the different services provided by pharmacists in relation to PN therapy.[18] The review on the role of pharmacists in providing PN therapy is described in Chapter 3.

For preparing the literature review on CBPE, a comprehensive search was conducted on PubMed and Scopus databases using different keywords related to the topic (from 1975 to 2019).[21] Other electronic resources were also used to identify educational outcomes of pharmacy programmes emphasising competency development and competency frameworks/standards for pharmacy profession.[21] The review process followed a systematic approach to identify the references suitable for detailed examination.[21] The included resources were articles/references describing the application of CBE in the education and training of healthcare professionals with a focus on the pharmacy profession.[21] The references were excluded if they provided only limited information on CBE in relation to healthcare professional education or were not published in English.[21] The relevant information from the selected resources was assembled under the following themes: curricular development using CBE, teaching and learning, assessment, and benefits and challenges of implementing CBE.[21] The publications on CBPE are explained in detail in Chapter 4. Table 2.1 illustrates summary of the methods used in the publications presented in this thesis.

Table 2.1: Summary of the methods used in the publications.

Chapter No.	Key Publication	Summary of the Methods
Chapter 3	**Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care education in Kuwait: pharmacy students' perspectives. Pharm Pract (Granada). 2014;12(3):411.	A cross-sectional survey of pharmacy students at the Faculty of Pharmacy to explore their attitudes towards PC. Data were collected using a self-administered questionnaire.
	Katoue MG, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. Int J Clin Pharm. 2014;36(6):1170-1178.	A cross-sectional survey of hospital pharmacists to explore their attitudes towards PC. Data were collected using a self-administered questionnaire.
	Katoue MG, Al-Taweel D, Matar KM, Kombian SB. Parenteral nutrition in hospital pharmacies. Int J Health Care Qual Assur. 2016;29(6):664-674.	A descriptive qualitative study was conducted using face-to-face semi-structured interviews with TPN pharmacists to explore PN practices.
	Katoue MG, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait. Pharm Pract (Granada). 2016;14(2):680.	A qualitative study was conducted using in-depth, face-to-face semi-structured interviews with TPN pharmacists to explore pharmacists' role in PN therapy in Kuwait hospitals.
	Katoue MG. Role of pharmacists in providing parenteral nutrition support: current insights and future directions. Integr Pharm Res Pract. 2018;7:125-140.	A narrative literature review describing the role of pharmacists in PN therapy. A comprehensive literature review on the topic was conducted on PubMed database (from 1975 to 2017) and relevant clinical guidelines.
Chapter 4	**Katoue MG**, Al Haqan A. Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students. Med Princ Pract. 2013;22(5):489-494.	A descriptive study about the implementation of an interactive workshop for pharmacy students. Pre- and post- workshop questionnaires were used to assess students' perceived improvement in knowledge about antidiabetic medications and patient counselling skills.
	Katoue MG, Schwinghammer TL. Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs. In Fathelrahman AI, Ibrahim MI, Alrasheedy AA, Wertheimer AI, editors. Pharmacy education in the twenty first century and beyond: global achievements and challenges. London: Elsevier Academic Press, 2018.	A book chapter describing the application of CBE in pharmacy. A comprehensive literature review was conducted using different databases (PubMed and Scopus databases), textbooks and other electronic resources to describe the CBPE model, including defining basic terms/concepts, steps of constructing a competency-based pharmacy curriculum, benefits of CBPE and challenges to its implementation.

	Katoue MG, Schwinghammer TL. Competency-based education in pharmacy: a review of its development, applications, and challenges. J Eval Clin Pract. 2020;26(4):1114-1123.	A narrative literature review to provide an overview on the development and applications of CBPE. A comprehensive literature review on the topic was conducted on PubMed and Scopus databases, and other electronic resources (from 1975 to 2019) following a systematic search approach.
Chapter 5	**Katoue MG**, Awad AI, Al-Jarallah A, Al-Ozairi E, Schwinghammer TL. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait. Pharm Pract (Granada). 2017;15(3):1029.	A cross-sectional survey of pharmacy and medical students to determine their attitudes towards physician-pharmacist collaboration and views about barriers to collaboration. Data were collected using a self-administered questionnaire.
	Katoue MG, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty. J Interprof Care. 2021;35(2):208-216.	A cross-sectional survey of faculty members at Kuwait University HSC to explore their attitudes towards collaborative practice and IPE. Data were collected using a self-administered questionnaire.
	Katoue MG, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students. J Interprof Care. 2022, 36(1):117-126.	A cross-sectional survey of students at Kuwait University HSC to explore their attitudes towards collaborative practice and IPE. Data were collected using a self-administered questionnaire.
	Katoue MG, Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice. Scott Med J. 2015;60(4):176-181.	A descriptive study exploring the early experiences and perceptions of healthcare professionals about simulation. Healthcare professionals undertook a simulation module. A questionnaire was used to assess participants' initial perceptions of simulators. The findings from questionnaires were compared with the analysis of video recordings of teaching sessions and written reflections that were completed by participants.
	Katoue MG. "As if": a tool for experiencing team-based care. Clin Teach. 2020;17(6):723-725.	A descriptive study outlining the development of simulation-based sessions to train PharmD students on team-based care. The sessions include students' presentations and role-play to illustrate team approach to the management of patients with specific disease conditions.

Abbreviations: pharmaceutical care (PC), Total parenteral nutrition (TPN), Parenteral nutrition (PN), Competency-based education (CBE), Competency-based pharmacy education (CBPE), Health Sciences Centre (HSC), Interprofessional education (IPE), Doctor of Pharmacy (PharmD).

Chapter 3: Pharmaceutical care: exploring attitudes, barriers to implementation and current practices

3.1 Introduction

This chapter describes the first theme on PC and the five publications under this theme. This includes the two publications that explored the attitudes of pharmacy students and hospital pharmacists towards PC practice and their perceived barriers to implementation of PC in Kuwait.[14, 15] The other set of publications under this theme investigated PN therapy as a particular area of pharmacy practice that would benefit from the implementation of PC practice.[16-18] These publications are included in Appendix 3.

3.1.1 Pharmaceutical care

As previously stated, PC is a patient-centred and outcome-oriented practice model in which pharmacists assume direct responsibility for all patients' medication-related needs to improve the quality of their lives.[35-37] The patient care process in PC includes establishing a therapeutic relationship with the patient, identifying actual or potential DTPs through assessment, developing a patient specific care plan to prevent or resolve DTPs, and follow-up monitoring to ensure the achievement of the desired therapeutic outcomes.[37, 202]

After the initial proposal of PC concept in the US by Hepler and Strand,[37] several practice models with different terminologies were introduced and applied in different countries to reflect similar objectives and principles to those of PC.[203] Examples include clinical pharmacy services, medicines management, medication management services, medication use review, medication therapy management, and medicines

optimisation.[4, 39, 203, 204] In 2013, an updated definition of PC was proposed by the board of the Pharmaceutical Care Network Europe (PCNE), following a review of the existing definitions to reach a consensus approach among this panel of PC experts.[205] The PCNE definition stated that PC is "the pharmacist's contribution to the care of individuals in order to optimise medicines use and improve health outcomes".[205]

3.1.2 Pharmaceutical care and pharmacy education

Pharmacy curricula have been incorporating PC educational content to equip students with the necessary knowledge base and skills to practise PC.[39, 203] Pharmacy students must be prepared with baseline knowledge including awareness of PC concepts and related processes, pathophysiology, pharmacology, pharmacotherapy, and the skills to perform patient assessment, interpret clinical laboratory data, interview patients and communicate with them, and document interventions and medical data.[203] Moreover, students must receive proper training and professional socialisation to assume a proactive type of practice which supports development of pharmacist-patient relationship and pharmacist's ability to identify and correct DTPs.[41] It is equally essential to develop students' positive attitudes towards PC.[42]

As described in Chapter 1, Kuwait University Faculty of Pharmacy has integrated education and training about PC concept and practice skills in the B Pharm programme.[14, 33] It has been anticipated that as pharmacy graduates enter into practice, pharmacy practice would change to reflect the changes in knowledge base and skills they received during their formal education and training. However, the author perceived a gap between the educational preparation these pharmacists receive at the Faculty and what they actually practise in hospitals. Therefore, she conducted two

survey-based studies to investigate the attitudes of pharmacy students and hospital pharmacists towards PC and the barriers to its implementation in Kuwait.[14, 15]

3.1.3 Parenteral nutrition

Nutrition support is a specialised area of clinical pharmacy that has been saving the lives of patients who have dysfunctional or inaccessible GI tract.[50] Nutritional support activities and services that are run by pharmacists have increasingly extended beyond compounding of sterile, stable and compatible PN admixtures to the clinical management of patients receiving PN.[206] The interdisciplinary NSTs have been regarded as the preferred approach to PN therapy and pharmacists began to play a leadership role in these teams.[206, 207]

As described in Chapter 1, pharmacists with expertise in nutrition support can collaborate with physicians and other members of the NSTs to implement a patient's specific nutrition care plan while also optimising their drug therapies and preventing and resolving DRPs.[57-62, 208] This would ideally involve pharmacists' participation in the assessment of patient's nutritional needs, development and implementation of an individualised nutrition care plan for the patient and monitoring patient's response to therapy.[58] Therefore, PN is an ideal area of pharmacy practice to provide PC services that can optimise patient care and therapeutic outcomes.[18, 61, 62]

Although TPN preparation services were established early in Kuwait governmental hospitals, this area of pharmacy practice was not described in any previous publications.[16] The author initially investigated PC practice in general,[14, 15] and then explored PC provision in PN therapy in particular as an example of a typified clinical

pharmacy service to illustrate the extent of the implementation of PC in hospitals.[16, 17] Subsequently, she published a literature review article that describes the role of pharmacists in providing PN support.[18] These publications are described in the following sections.

3.2 Key publication 1: Pharmaceutical care in Kuwait: pharmacy students' perspectives

3.2.1 Background

A number of studies has assessed the attitudes of pharmacy students towards PC in some developing countries.[48, 49] Even though the concept of PC has long been integrated in the pharmacy curriculum in Kuwait, there were no previous studies that evaluated the attitudes of pharmacy students towards PC or their perceived preparation to provide PC.[14] Investigating these topics would provide useful information to guide curricular improvement.[14] Therefore, the objectives of this study were to explore the attitudes of pharmacy students at Kuwait University Faculty of Pharmacy towards PC, perceptions of their preparedness to perform PC competencies, opinions about the importance of the various PC activities and perceived barriers to PC implementation.[14] The study targeted three different student cohorts from two professional years (fourth and fifth year) to compare students' self-reported competency levels and perceived importance of PC activities at different stages of the curriculum.[14]

3.2.2 Article development

The author read articles on the PCAS and PREP survey instruments.[173, 174, 179, 180] She detected a lack of publications that document the status of PC education or investigate students' attitudes towards PC in Kuwait. An internationally recognised expert in

pharmacy education, Professor Terry L. Schwinghammer visited the Faculty of Pharmacy to provide academic consultation and advice about the courses of the Department of Pharmacology and Therapeutics, where the author works. Professor Schwinghammer is a Professor Emeritus and former Chairman of the Department of Clinical Pharmacy, West Virginia University School of Pharmacy, the US. The author met the professor during his visit to the Faculty and discussed with him the idea of the research topic. They agreed to collaborate with two professors from the Faculty (Professor Abdelmoneim I. Awad and Professor Samuel B. Kombian) to conduct this research at two levels: a study among pharmacy students and another study among hospital pharmacists (Appendix 2).[14, 15] In the first study, a descriptive, cross-sectional survey of pharmacy students (n=126) was conducted at the Faculty of Pharmacy.[14] Data were collected using a pre-tested self-administered questionnaire from three student cohorts from two professional years (fourth and fifth year), each representing a professional class at a different stage of the curriculum.[14] This included fifth-year students (2011-2012) (n=27) and fourth-year students (2011-2012) (n=36) who were surveyed in 2012 at the end of the second semester, and fourth-year students (2012-2013) (n=63) who were surveyed in 2012 at the end of the first semester.[14]

3.2.3 Key findings

The response rate was 99.2%.[14] Pharmacy students expressed overall positive attitudes towards PC.[14] They felt prepared to implement the various aspects of PC, with the least preparedness reported in the administrative/management aspects of PC such as management of pharmacy fiscal and human resources, evaluation, selection and purchase of pharmaceuticals.[14, 173, 174] Students' perceived preparedness to implement the different PC competencies and appreciation of the importance of PC activities

increased as they progressed through the curriculum.[14] Students agreed/strongly agreed that the major barriers to the integration of PC into practice were lack of private counselling areas or inappropriate pharmacy layout (95.2%), lack of pharmacist time (83.3%), organisational obstacles such as lack of health care policy to support role of pharmacists in patient care (82.6%), and pharmacists' physical separation from patient care areas (82.6%).[14] Other perceived barriers were lack of physicians' trust in the pharmacists' abilities (77.7%), lack of adequate communication/coordination with physicians (74.6%), physicians' resistance to pharmacists' role (71.5%), and inadequate teamwork among healthcare professionals (68.2%).[14]

3.2.4 Discussion and impact of the publication

This study showed that pharmacy students at Kuwait University support implementation of PC while also recognising the barriers to its implementation in practice.[14] These results concur with the findings of other studies in which pharmacy students were identified to hold positive attitudes towards PC concept in the US and other countries.[48, 49, 180] The findings also showed stepwise improvements in students' perceived preparedness to implement PC competencies and appreciation of the importance of PC competencies as they advance through the curriculum.[14] This would reflect that students develop better understanding about PC practice skills and their confidence to implement PC competencies gradually improves as they continue their coursework and experiential training.[14] However, the findings revealed a need to improve students' preparedness in the administrative/management aspects of PC.[14]

Since fourth and fifth year pharmacy students undertake experiential training at different pharmacy settings, they could observe and report the main barriers to PC

implementation.[14] The main reported barriers by students were previously identified in a study conducted in Kuwait,[46] and also in studies conducted in some developed countries.[40, 43] The article provided recommendations to overcome the main barriers reported by students and to enhance students' educational preparation for PC practice.[14] These included suggestions to improve the clinical practice of pharmacists, expand PC provision in practice settings so students can have suitable sites for experiential training and to provide specific training to students' preceptors.[14] The article also recommended the use of simulation to help students acquire the necessary practice experience.[14]

The students reported inadequate communication/collaboration with physicians and lack of teamwork among healthcare professionals to be among the significant barriers to the implementation of PC.[14] Therefore, the article suggested implementing IPE among undergraduate health students in Kuwait starting from the earliest stages of their degrees and spanning their entire academic study.[14] This motivated the author to explore educational topics such as simulation and IPE in subsequent research publications as described in Chapter 5.[23-26]

The article also called for enhancing the collaboration between the Faculty and healthcare authorities (MoH) to bridge the gap between the Faculty delivered PC education and pharmacy practice in Kuwait.[14] Other suggested solutions included a call to establish "National Standards of Practice or Competencies" for the profession to ensure the quality of pharmacy education and practice.[14] The author subsequently explored the concept of CBPE in two publications that are outlined in Chapter 4.[20, 21] Furthermore, this publication initiated a collaboration between the author and

researchers from Qatar University School of Pharmacy to conduct a comparative study assessing the attitudes and perceived preparedness to provide PC among final year pharmacy students in Qatar and Kuwait.[33] Later on, the author collaborated with researchers from Qatar and the United Arab Emirates to write a systematic literature review describing PC education in the Middle East and North Africa region.[7]

3.3 Key publication 2: Pharmaceutical care in Kuwait: hospital pharmacists' perspectives

3.3.1 Background

As outlined earlier, the Faculty of Pharmacy has been preparing pharmacy graduates with PC competencies.[14, 33] However, it is important to consider that pharmacists in Kuwait are multinational with different educational backgrounds. It was vital to investigate if these pharmacists have the necessary competencies and positive attitudes to assume PC practice.[15] Therefore, the objectives of this study were to explore hospital pharmacists' attitudes towards PC, perceptions of their preparedness to perform PC competencies and opinions about the potential barriers to PC implementation in Kuwait.[15]

3.3.2 Article development

The same collaborators participated in this study which represented the second phase of the PC research project. While reporting the study findings in this article, the research team attempted to provide recommendations to improve the adoption and implementation of PC in hospitals.[15] A descriptive, cross-sectional survey was disseminated to pharmacists in all governmental hospitals in Kuwait (385 pharmacists).[15] Data were collected using a pre-tested self-administered

questionnaire.[15] The author distributed the developed questionnaire to the pharmacists herself and with the assistance of some pharmacists.[15]

3.3.3 Key findings

A total of 250 pharmacists completed and returned the questionnaire (response rate 64.9%).[15] Pharmacists expressed overall positive attitudes towards PC.[15] They felt well prepared to implement the various aspects of PC, with the least preparedness in the administrative/management aspects.[15] Pharmacists with more practice experience expressed significantly more positive attitudes towards PC ($p=0.001$) and felt better prepared to provide PC competencies ($p<0.001$) than those with less experience.[15] The respondents agreed/strongly agreed that the most significant barriers to the integration of PC into practice were: lack of private counselling areas or inappropriate pharmacy layout (87.6%), organisational obstacles (81.6%), inadequate staff (79.6%), and lack of pharmacist time (76.0%) and adequate technology (76.0%).[15] Other highly rated barriers included poor teamwork of the healthcare professionals (74.4%) and lack of communication/coordination with physicians (72.8%).[15]

3.3.4 Discussion and impact of the publication

The findings of this study showed that hospital pharmacists in Kuwait hold positive attitudes towards PC practice.[15] This is consistent with the findings of similar studies conducted in several countries.[44, 45, 47] Pharmacists with more practice experience expressed significantly more positive attitudes than less experienced pharmacists.[15] Contrary to what was expected, the more experienced pharmacists also rated their preparedness to perform PC competencies significantly higher than did the less experienced pharmacists despite the fact that the recently qualified pharmacists would

have received more training on PC practice.[15] This is opposing to the notion that older-generation pharmacists might resist the change in practice.[38]

The pharmacists identified a list of barriers that impede PC implementation in their clinical settings.[15] These barriers concur with the findings of a previous study conducted among hospital pharmacists in Kuwait,[46] and also in studies conducted in some developing countries,[45, 47] and developed countries.[40, 43] The most significant barrier to integrating PC into practice was the inappropriate pharmacy layout.[15] Pharmacists usually dispense medications to patients through typical dispensing windows in the hospital outpatient pharmacies.[28] This would create an obstacle to pharmacist-provided patient counselling and compromise the privacy of patient consultation.[15] The study recommended creating dedicated private areas for consultations within hospital outpatient pharmacies.[15] The study also suggested establishing national policy/legislations to define the emerging professional roles of the pharmacist in patient care.[15] It also proposed improved coordination among the duties of pharmacists and pharmacy technicians to overcome lack of pharmacist time to provide PC services.[15]

The pharmacists reported lack of adequate technology to be among the barriers to PC provision.[15] At the time of this study, there was a limited use of the health information technology (IT) systems in the hospitals.[15] Therefore, the study recommended enhancing application of health IT in the healthcare system such as electronic health records (EHRs) and computerised prescriber-order-entry (CPOE).[15] A recent study has reported significant improvements in health information management practices in public hospitals in Kuwait.[209] To overcome the reported inadequate teamwork among

healthcare professionals, the study called for implementing IPE in the education of health sciences students in Kuwait in view of the documented benefits of IPE in supporting collaborative practice.[15, 109] It also recommended that pharmacists practise closely to physicians on hospital wards to boost physicians' trust in pharmacists' clinical abilities and promote collaborative practice.[15, 210]

The author distributed copies of the article to the Head of Pharmacy Departments of all hospitals to share with them the findings and recommendations. Significant improvements in the structure of hospital pharmacies have been implemented with many pharmacies allocating private patients counselling areas. Moreover, the MoH and Faculty of Pharmacy have been collaborating to develop the clinical pharmacy services in the healthcare system.[34] Researchers from different countries contacted the author to request from her to share with them the developed questionnaire that was used in the studies assessing attitudes towards PC.[14, 15] The author shared the questionnaire with these researchers to help them implement similar research projects that would help develop PC practice at their settings.

3.4 Key publication 3: Parenteral nutrition in hospital pharmacies: exploring the practices and identifying opportunities for quality improvement

3.4.1 Background

Clinical pharmacy services were generally limited in the healthcare settings in Kuwait.[28, 29] Since PN is considered a high-risk therapeutic feeding method,[51, 54, 55] the author felt that PN would be an ideal avenue for providing PC services to benefit the patients. After the publication of the two studies that explored PC in general,[14, 15] the author decided to focus her PC research on this specific area of pharmacy practice.

There were no previous publications that investigated this area of pharmacists' professional practice in Kuwait.[16] Therefore, the objectives of this study were to explore PN practices in hospital pharmacies of Kuwait and identify potential opportunities for quality improvement in this service.[16]

3.4.2 Article development

As a continuation to her research on PC practice, the author wanted to study the extent of PC implementation in a specialised area of pharmacy practice, PN therapy. In view of the small number of hospitals which provide TPN preparation services in Kuwait, the author was advised to conduct qualitative interviews with the head TPN pharmacists in these hospitals to describe PN practices. The collaborators in this research included an assistant professor of Pharmacy Practice who participated mainly in the analysis of qualitative data and two professors of Pharmacology and Therapeutics who were teaching pharmacy students about nutrition support. Appendix 2 describes the roles of the author and the collaborators. A descriptive qualitative study about PN practices at Kuwait hospitals was conducted from June 2012 to February 2013.[16] Data were collected using face-to-face semi-structured interviews with the head TPN pharmacists at hospitals using a developed instrument.[16]

3.4.3 Key findings

The results of this study showed that seven hospitals in Kuwait provided PN preparation services through TPN units within hospital pharmacies.[16] Functional NSTs did not exist in any of these hospitals.[16] The pharmacists reported the use of paper-based standard PN order forms that were hand-written by physicians for requesting PN.[16] The main reported issues with these forms included problems related to the

legibility of the included information, incorrect methods of prescribing PN components, and missing or incorrect amounts of nutrients.[16] The content of PN order forms and PN formulas labelling information were inconsistent across the hospitals.[16] Most of the prepared PN formulas were tailor-made and packed in single compartment bags.[16] Quality controls used by pharmacists included the gravimetric analysis and visual inspection of PN formulations, and less consistently reported the periodic evaluation of the aseptic techniques.[16] Six TPN units independently developed PN guidelines/protocols.[16]

3.4.4 Discussion and impact of the publication

By identifying the PN practices and comparing these practices across the hospitals, this study revealed discrepancies in many aspects of PN practices among these hospitals.[16] This also enabled a comparison between PN practices against the established clinical guidelines and thus provided an opportunity to provide some recommendations to improve PN practices.[16]

The study showed that seven hospitals in Kuwait offered PN preparation services through specialised TPN units within hospital pharmacies.[16] However, none of these hospitals had an active NST to supervise PN therapy.[16] Provision of collaborative care by NSTs to patients receiving PN therapy has been found to improve patients' outcomes and reduce PN-associated complications.[55, 57] This is also supported by the clinical PN practice guidelines issued by recognised organisations in the UK and the US.[211, 212] Thus, the study highlighted a need for developing NSTs at the hospitals and enhancing pharmacist involvement in the clinical areas of PN therapy to optimise patient care.[16]

The study revealed that standard PN order forms were used in all hospitals for requesting PN but these forms were variable in their design and some did not include any hospital PN operational policy or decision support guidance.[16] Available practice guidelines recommend the use of simply organised PN order forms that include institutional policies and basic PN education instructions.[50] Therefore, the study suggested improving the used PN order forms by supplementing them with these essential information to provide guidance to the prescribers on patient nutritional requirements.[16] The study also proposed implementation of CPOE system for PN ordering to overcome the problems related to the clarity of hand-written PN orders.[16] The study exposed differences in PN orders and labelling information across the hospitals.[16] The inconsistencies in PN ordering and labelling practices can lead to confusion when patients are transferred across healthcare settings suggesting a need to standardise these practices.[16, 50]

Moreover, most of the prepared PN formulations in the hospitals were tailor-made formulas prepared in single compartment bags.[16] Commercial ready-made PN formulas were not used in any of the hospitals.[16] The study suggested to evaluate the cost-effectiveness of purchasing such products as they can fulfil the urgent needs of patients for PN therapy.[16]

The reported PN quality controls included visual inspection of PN formulas that was complemented by gravimetric analysis.[16] These findings are similar to PN practices in other countries.[65] However, a significant discrepancy was observed among hospitals regarding the type and frequency of assessing the aseptic techniques.[16] Process validation of aseptic techniques is recommended for PN formulations by safe PN

practice guidelines.[50] The study reported that six TPN units independently developed PN guidelines/protocols and revealed lack of national standards of PN practices in Kuwait.[16] Therefore, the study called for standardisation of PN practices to improve the quality of care provided to patients receiving PN and facilitate national monitoring of TPN services.[16] This study provided a description of PN practices at hospitals in Kuwait and thus established the baseline from which the healthcare authorities can initiate a standardised approach to PN practices.[16]

3.5 Key publication 4: Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait

3.5.1 Background

As previously mentioned, PN therapy is ideally provided to patients by the multidisciplinary NSTs.[57, 58] The findings of the study describing PN practices revealed lack of NSTs at Kuwait hospitals in general and the involvement of pharmacists within such teams in particular.[16] Therefore, a qualitative study was conducted to provide an in-depth understanding about the role of pharmacists in this specialised area of pharmacy practice in Kuwait hospitals.[17] The objectives of this study were to explore pharmacists' role in PN therapy, sources of PN-related information, opinions on NSTs, perceptions about the barriers to PC implementation in this area of practice, and views on how to enhance their practice in relation to TPN services.[17]

3.5.2 Article development

To explore PC implementation in this specialised areas of pharmacy practice, the author developed an interview guide which was used to conduct in-depth, face-to-face

semi-structured interviews with the head TPN pharmacists at the seven hospitals which provide TPN preparation services in Kuwait.[17] Then, the author transcribed the recorded interviews verbatim.[17] The co-author of this article assisted the author in the analysis of the qualitative data (Appendix 2). The themes were generated from the interviews transcripts and were checked by the author and the co-author.[17] Then, the author wrote the article which provided recommendations to improve PC provision in this area of pharmacy practice.[17]

3.5.3 Key findings

The study showed that the pharmacists mainly performed technical tasks such as TPN compounding with limited role in providing direct patient care.[17] The pharmacists reported that they use multiple different sources of TPN-related information.[17] Most of the pharmacists reported poor collaboration with physicians regarding patient care.[17] Pharmacists expressed preference to work within NSTs due to the potential benefits of enhanced communication and knowledge exchange among practitioners.[17] They reported several barriers to the provision of PC and optimisation of TPN services.[17] These included lack of reliable sources of TPN-related information, lack of a standard operating procedure for TPN across hospitals, insufficient staff, time constraints and poor communication between TPN pharmacists.[17] To overcome these barriers, pharmacists recommended fostering the education and training of pharmacists on TPN, creating national standards for TPN practices, providing more pharmacy staff, developing NSTs at hospitals, enhancing communication between TPN pharmacists and conducting research in this area.[17]

3.5.4 Discussion and impact of the publication

This study explored the role of pharmacists in PN therapy and revealed that pharmacists were mainly performing technical duties such as compounding PN formulations with limited roles in providing direct patient care.[17] It also reported a list of substantial barriers that hinder PC implementation in this area of pharmacy practice.[17] These findings are reflective of the findings reported in the author's earlier published studies on PC provision in general.[14, 15] The provision of PC services to patients receiving PN therapy has proven to be of value in improving patients' clinical outcomes in countries where these services are well established and utilised.[61, 62] Pharmacists' monitoring of these patients has been shown to improve patients' nutritional status and clinical outcomes, and to reduce PN complications and costs of therapy.[207, 213] Therefore, the study called for enhancing the education and training of pharmacists to practise as NSPs with patient-centred roles.[17]

This study showed that PC services in relation to PN therapy were limited at hospitals.[17] Most pharmacists reported lack of collaborative practice experiences with physicians.[17] The collaboration of pharmacists with physicians in PN therapy has been reported to be effective in improving patients' safety and clinical outcomes.[207, 214] The study suggested that PN therapy can be an ideal area to initiate pharmacist-physician collaboration and for pharmacists to assume the PC practice model.[17]

All participants expressed positive attitudes towards team approach to management of patients receiving PN therapy by NSTs.[17] There is ample evidence to support the benefits of NSTs on improving the efficacy and safety of PN therapy,[55, 57, 59, 65] and reducing healthcare costs.[59, 215] Therefore, the study recommended development of

functional, well-managed NSTs to improve quality of TPN services and patient care.[17] To achieve that goal, the study suggested to integrate IPE in the education of health sciences students and to establish national standards of TPN practices which include explicit guidelines on the development of NSTs.[17]

In this study, participants reported a number of barriers to PC practice in relation to PN therapy and they provided suggestions to overcome these barriers.[17] Some of these barriers were consistent with findings of earlier studies about PC in Kuwait.[14, 15, 46] They reported a lack of a reliable source of information on TPN or standard TPN operating procedure across hospitals.[17] A standardised process for TPN practices would improve effectiveness and safety of PN therapy and enhance efficient utilisation of resources.[16, 52] Therefore, pharmacists suggested development of a standard reference for safe TPN practices to achieve standardisation of TPN practices across hosptitals.[17] Pharmacists also agreed on the need of fostering pharmacists' education and training on PN therapy to undertake expanded clinical roles in this area of pharmacy practice.[17] In addition, they recommended provision of more pharmacy staff especially qualified pharmacy technicians, developing NSTs at hospitals, improving communication among TPN pharmacists for expertise exchange and conducting TPN-related research activities.[17] The Faculty of Pharmacy and health authorities were advised to address the training needs of TPN pharmacists and to consider their suggestions to enhance the quality of TPN services.[17]

The author shared these findings with academic staff members at the Faculty to help improve students' education and training in PN therapy. The Kuwait Medical Journal which is the official journal of Kuwait Medical Association published the abstract of

this study.[216] This provided an opportunity to share the findings with this journal readership - physicians in Kuwait. Moreover, the author delivered a seminar to multidisciplinary healthcare professionals working in Kuwait Cancer Centre to share these results and highlight the value of NSTs to the quality of patient care (Appendix 1). The author also shared the interview guide that was used in this study with researchers from Saudi Arabia upon their request to assist them in conducting a similar study. Lack of NSTs at hospitals influenced the author's subsequent research directions towards IPE and SBE as a means to prepare future healthcare professionals for collaborative practice. These topics are explored in further details in Chapter 5.

3.6 Key publication 5: Role of pharmacists in providing parenteral nutrition support: current insights and future directions

3.6.1 Background

As described earlier, NSTs are essential for the delivery of safe and effective PN therapy to patients and pharmacists have central roles in these teams.[57-60, 207] The NSPs can provide a variety of PN-related services ranging from compounding and dispensing of PN formulas to the clinical management of patients receiving PN therapy.[58] The ASPEN Standards of Practice for NSPs describe in detail the range of the services that NSPs deliver in practice.[58] However, there was lack in published literature reviews that describe the unique contributions of pharmacists in relation to PN.[18] Therefore, the objective of this narrative literature review was to describe pharmacists' different roles and services in relation to PN therapy.[18]

3.6.2 Article development

Following the publication of the two articles on PN therapy in Kuwait,[16, 17] the author received an invitation from the Integrated Pharmacy Research and Practice Journal to write a review article describing the role of pharmacists in providing PN support. The author agreed with the journal editorial office on a general outline for the review article. Accordingly, the author conducted a comprehensive literature search of the published literature in PubMed Database and the relevant standards of practice and clinical guidelines (ASPEN and ASHP) during the period from 1975 to 2017 to describe and evaluate pharmacists' different roles and provided services related to PN support.[18, 50, 58]

3.6.3 Key findings

The review revealed different roles of pharmacists in relation to PN therapy.[18] These include the assessment of patients' nutritional needs, the design, compounding, dispensing and quality management of PN formulations, monitoring patient response to PN therapy and supervision of home PN programmes.[18] Other roles include education of patients, caregivers and other healthcare professionals on nutrition support, participation in NSTs and conducting PN-related research and quality improvement activities.[18] These services are different across clinical settings and among different countries depending on pharmacist clinical practice.[18] However, each of these practice domains helps to support the delivery of safe and effective PN therapy to patients.[18]

3.6.4 Discussion and impact of the publication

The review summarised the existing literature that supports the active participation of pharmacists in providing PN-related services.[18] It showed that pharmacists have increasingly been involved in the clinical management of patients receiving PN therapy, thereby assuming PC practice.[18, 60-62] The review highlighted that PN therapy would be an ideal opportunity for pharmacists to provide PC services to patients.[18] Patients receiving PN therapy often receive multiple medications along with PN therapy to manage their clinical conditions.[18] Pharmacists can assist in the proper selection and monitoring of these medications to optimise their use and prevent any interactions or incompatibility problems between these medications and PN.[58, 60] They can also participate in the prevention, detection and resolution of DRPs in patients receiving PN therapy.[60-62, 208] There is sufficient evidence to support the benefits of pharmacists' participation in the care of patients receiving PN therapy.[60, 207, 213, 214]

The review described the developmental milestones in nutrition support in clinical pharmacy.[18] It outlined the different functions of NSPs and the evidence supporting the benefits of NSTs and the leadership role of pharmacists in these teams.[18, 58, 60, 207] Most of the evidence describing pharmacists' role in the management of patients requiring PN and utilisation of NSTs were retrieved from developed countries, especially the UK and the US.[55, 59, 60, 215] Thus, the review called for conducting more studies to evaluate pharmacists' role in this area of pharmacy practice and the need to develop NSTs in developing countries.[18]

Pharmacists must be equipped with the necessary education and training to assume their clinical responsibilities in relation to PN therapy.[18] Therefore, the review

suggested different certification options and CPD opportunities for pharmacists in relation to nutrition support.[18] The review also proposed ways to improve PN services.[18] The suggestions included standardisation of PN practices and establishment of PN protocols and practice guidelines to support the leadership role of pharmacists in this area of practice.[18] This review article was published in an open access journal which made it available for a wide readership and repeated citations.

3.7 Summary

The author believed that conducting research on PC would provide useful insights to help link pharmacy practice needs with the education and training offered by the Faculty of Pharmacy. Therefore, she initially explored the attitudes of pharmacy students' towards PC to assess the efficacy of the pharmacy curriculum in equipping the students with the needed positive attitudes and confidence to implement PC.[14] In the two studies investigating the attitudes of hospital pharmacists towards PC and role of pharmacists in PN therapy, the author evaluated the needs of these practitioners and perceived barriers to PC implementation in general and with a focus on PN in particular.[15, 17] Thus, PN was used as a case study to evaluate the extent of implementation of PC in a specific area of pharmacy practice that would benefit from expanding the scope of pharmacist practice to include patient care roles.[17]

The studies indicated that pharmacy students and pharmacist practitioners hold positive attitudes towards PC and perceived themselves to be prepared to implement PC practice.[14, 15] However, they reported that PC practice was challenged by several barriers.[14, 15] These publications served as avenues to highlight the needed educational

and organisational reforms to facilitate the adoption and implementation of PC practice in Kuwait.[14, 15]

The publications on PN practices in hospitals and pharmacists' role in PN therapy emphasised that this area of pharmacy practice can greatly benefit from pharmacist-provision of PC services.[16-18] This arises from the critical nature of this high-risk feeding modality and the documented benefits of pharmacists' contribution to patient care in collaboration with other members of the NSTs.[60, 207, 213, 214]

The PC research informed other elements of the author's research journey that were focussed on pharmacy education. These included exploring the use of active learning methods and the concept of CBPE to prepare pharmacy graduates with the necessary professional competencies to meet patients' healthcare needs.[19-21] Another focus of the author's research was on IPE and SBE to equip pharmacy students with the required collaborative practice skills to enable them to engage effectively in PC practice.[23-26] The publications on these educational topics are covered in Chapters 4 and 5.

Chapter 4: Pharmaceutical care: from classroom to clinical practice

4.1 Introduction

This chapter covers the theme which is related to developing pharmacy education to support PC practice. The chapter describes three publications that include one article investigating the use of active learning methods in pharmacy students' education and two publications describing the concept of CBPE.[19-21] These publications are outlined in Appendix 4.

As explained in Chapter 1, pharmacy education had to adapt to the evolution in the scope of pharmacy practice.[9] Pharmacy educators needed to continually improve the content and delivery methods of pharmacy programmes to achieve the intended educational outcomes of these programmes and to meet the requirements for PC practice.[203] In terms of content, it has been increasingly recognised that pharmacists need to acquire knowledge and professional skills beyond basic pharmaceutical sciences.[203] In addition to these essential subjects, pharmacists must learn about, and become competent to apply the different PC activities.[217, 218] They must be prepared to perform an accurate assessment of patients' medications, perform suitable clinical interventions and monitor therapy to ensure the effective and safe use of medications.[2] Other skills may be required for pharmacist's contemporary role such as prescribing, risk management, and diagnostic and consultation skills.[68] Accordingly, pharmacy curricula have been moving away from adopting the traditional pharmaceutical sciences-based approach towards a clinical-based approach.[203]

The delivery of effective PC services by pharmacists requires not only ability of knowledge recall, but pharmacists must also have several other skills including

communication, clinical decision making, critical thinking and problem-solving skills.[2, 203] Therefore, Schools of Pharmacy have been replacing the traditional didactic lectures and laboratories with active learning strategies that develop students' factual recall, in addition to professional skills and attitudes.[219] A systematic review of the literature on PC instructional methods revealed the use of different combinations of teaching methods, with the most commonly used methods being SBE followed by CBL and PBL.[220] There is sufficient evidence to demonstrate the positive outcomes of using active learning methods in pharmacy education.[69, 74]

The use of multiple active learning strategies is supported by educational theories describing learning styles and stages.[9] Students exhibit preferred learning styles which are shaped by their personalities, prior learning experiences and cognitive processes, thereby they learn in different ways.[221] Understanding students' learning styles and preferences, and using learning methods that integrate a multisensory approach can enhance the effectiveness of students' learning.[9, 222]

There are several learning theories and models that describe learning stages/styles.[9] For example, Kolb[223] proposed a learning cycle in which learning occurs as a result of the transformation of experience. This cycle is composed of four stages: feeling (concrete experience), watching (reflective observation), thinking (abstract conceptualisation) and doing (active experimentation).[223, 224] In this learning cycle, learners initially undertake a concrete experience upon which they think and reflect.[222] This would enable them to formulate abstract concepts.[222] Then, they consolidate their interpretations by testing the implications of this knowledge in new situations resulting

in concrete experience.[222] This theory explains student learning process through SBE and experiential learning.[67, 152]

In another model, the learning styles were classified into visual, auditory and kinaesthetic learning, and thus the model was called the VAK model.[225] This model suggests that up to 80% of learners depend on their sight (viewing and watching) as their primary learning style whereas about 10% of learners learn by the sense of hearing (listening and speaking) and between 25%-50% of leaners are kinaesthetic learners (learn by doing).[225]

It is also important to note that the retention of a newly gained knowledge would vary according to the learning method.[9, 226] In the learning pyramid model, Dale[226] proposed that the maximum average retention rate of new information that learners retain after 24 hours is achieved through activities that were classified as "participatory teaching methods". These include: teaching others (90%), practise by doing (75%), and discussion group (50%).[226] This is followed by a set of activities that were classified as "passive teaching methods".[226] These include: learning through demonstration (30%), audiovisual (20%), reading (10%), and lecture (5%).[226] However, other educators identified lack of evidence to support the described hierarchy of students' retention in this model.[227] Therefore, pharmacy educators must use multiple teaching and learning methods, preferably creating a blended (multiple-format) learning experiences to match the different learning styles of students.[9, 225]

When planning learning programmes, it is important to start by thinking about the intended learning outcomes.[222] A classical model of learning outcomes is the Bloom's

taxonomy, in which a learner ascends in stages from *knowledge*, to *comprehension*, to *application*, to *analysis*, to *synthesis* and finally to *evaluation*.[228] The Miller's pyramid (or Miller's triangle) is perhaps the most widely used guide for planning and assessment within a curriculum.[229] According to Miller's pyramid, the learner advances in stages from *Knows* (knowledge), to *Knows how* (competence), to *Shows how* (performance), and finally to *Does* (action).[229]

Because PC is the mission of pharmacy profession,[36] it has become necessary to link the intended educational outcomes of pharmacy curricula to achieving the responsibilities and functions of a PC practitioner.[230] The educational outcomes of the curricula of Schools of Pharmacy need to cover basic pharmaceutical sciences, professionalism, ethics, and IPE required for PC practice, as well as other evolving aspects of pharmacy practice.[217] Consequently, the educational outcomes for the curricula of pharmacy programmes evolved in several countries to encompass these aspects.[217] For example, the standards for the initial education and training of pharmacists which are issued by the General Pharmaceutical Council (GPhC) define the required educational outcomes of pharmacy programmes in the UK.[68] Similarly, academic associations and the accreditation standards for pharmacy programmes in North America mandate the curricula of entry-to-practice professional degree programmes in pharmacy to be constructed as outcome-based curricula.[231-234]

There is close resemblance between the outcome-based education (OBE) model and CBE.[88] Indeed, CBE can be viewed as a type of OBE.[88] The OBE model focusses on learner/programme outcomes rather than the processes or paths used to attain these outcomes.[88] In OBE model, the curricular content, instructional and assessment

methods are all targeted towards what learners must be able to perform after the completion of the curriculum.[235] In CBE, the expected outcomes of the curriculum represent the abilities that the graduates need to acquire for professional practice.[88] This can subsequently determine the curricular content, learning methods and assessment strategies.[89] Furthermore, CBE enhances the capacity of learners to integrate knowledge, skills, values and attitudes to accomplish an anticipated level of professional performance.[236]

To fulfil the demands of societies and evolving healthcare systems, Schools of Pharmacy have started to define the required professional competencies in the educational outcomes of pharmacy programmes.[68, 231, 233] Several pharmacy professional organisations have also developed competency frameworks and standards for professional practice in different countries.[87, 237-245] These have been developed to support the construction of CBPE curricula, accreditation standards of pharmacy programmes, assessment of pharmacists' competence for professional pharmacy registration/licensure and CPD programmes.[20, 21, 203, 246]

As described in Chapter 1, the Kuwait University Faculty of Pharmacy adopted the PharmD programme to replace the B Pharm programme. The Faculty implemented CBPE in the add-on PharmD programme and the entry-to-practice PharmD programme. Three years earlier to this curricular reform, the author published an article describing the implementation of active learning methods in a workshop that she delivered to pharmacy students.[19] Then, the author wrote two publications about the CBPE model.[20, 21] These publications are described in the following sections.

4.2 Key publication 6: Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students

4.2.1 Background

Patient counselling regarding medications is essential for optimal PC practice.[41, 82] This process involves providing patients or their representatives with comprehensive medication-related information such as directions on use of the medications, guidance on potential side effects, precautions and storage conditions.[82] Pharmacists can have a central role in management of patients with diabetes through the proper selection of medications and provision of patient counselling and education regarding these medications.[247] This has been shown to improve patients' adherence to medications resulting in improved clinical outcomes,[248] and reduced costs of diabetes care.[247]

As outlined in Chapter 1, students' learning about PC used to be delivered mainly by didactic lectures and laboratories in the B Pharm curriculum.[11, 14, 31, 33] By applying these modes of large group teaching, students mostly act as passive recipients of information.[75] Adopting the use of a mix of large and small group teaching and learning methods has been described in the PC teaching literature.[220] The use of active-learning methods including group discussion, case studies and role-playing has been found effective in enhancing the counselling skills of pharmacy students.[81] There were no previous publications that described educational interventions using active learning methods from Kuwait.[19] Therefore, the objective of the article was to describe the implementation of a workshop in which the author piloted the use of interactive teaching and learning methods to train pharmacy students on patient counselling about antidiabetic medications.[19] It also aimed to determine the impact of the workshop on students' perceived competencies for counselling on these medications.[19]

4.2.2 Article development

As the author joined the postgraduate programme that was offered by the University of Dundee, she was introduced to new instructional techniques such as SBE and facilitation of small group learning. Subsequently, she began to transfer the newly acquired instructional skills to her workplace. The author implemented a workshop on patient counselling about antidiabetic medications for pharmacy students using a combination of large and small group teaching and learning activities.[19] These included brief interactive lectures to impart basic knowledge needed for counselling to students, small group discussions on case studies and role-play exercises to practise patient counselling.[19] A pharmacist who was enrolled in the same postgraduate programme collaborated with the author in the design and delivery of the workshop as explained in Appendix 2. The workshop was implemented during the academic year 2011-2012 for all final year pharmacy students (n=27).[19] Pre- and post-workshop questionnaires were used to evaluate the impact of the workshop on students' knowledge about the medications and attitudes towards patient counselling.[19] An evaluation sheet was used to evaluate students' satisfaction about the workshop.[19]

4.2.3 Key findings

The mean ± standard deviation of the pre- and post-workshop knowledge questionnaire scores were 47.9 ± 17.6% and 70.7 ± 18.6%, respectively ($p<0.05$).[19] This indicated that the workshop significantly enhanced students' understanding about antidiabetic medications.[19] The workshop also significantly improved students' self-reported confidence in communication with patients ($p<0.05$) and perceived competencies for counselling patients on the different antidiabetic medications ($p<0.001$).[19] All participants (100%) strongly agreed that the workshop and the used

learning activities were very useful.[19] Out of the used teaching and learning methods in the workshop (interactive lectures, small group discussion of case studies, role-playing), case discussion in small groups was ranked by most students (92.6%) as their preferred learning method.[19]

4.2.4 Discussion and impact of the publication

Adherence to the prescribed antidiabetic medications is essential for people with diabetes to maintain adequate control of their blood glucose levels and avoid long-term complications of diabetes.[249, 250] To achieve that goal, patients need to receive adequate education and counselling on these medications.[249] The use of interactive teaching and learning methods in this workshop enhanced students' confidence about patient counselling on antidiabetic medications.[19] This supports findings of a report documenting the effectiveness of active learning strategies in equipping pharmacy students with the skills necessary for counselling.[81]

Among the learning activities that were applied, the small group discussion of case studies was ranked as the most favoured learning method by students.[19] This aligns with findings of other reports indicating that small group learning and case-based approaches have been perceived positively by learners.[251, 252] During the workshop, role-play exercises were incorporated to portray pharmacist-patient interactions.[19] The students felt that their ability to communicate with patients was improved after the workshop.[19] Role-playing has been shown to be a useful approach for training pharmacy students on communication and counselling skills.[80, 81] Simulation experiences have also been found to be effective in improving pharmacy students' confidence in diabetes education skills.[253, 254] Students were generally satisfied about

the workshop and felt that it would assist them to provide effective PC services to patients with diabetes.[19] As a result of students' positive feedback, the article recommended organising similar workshops for pharmacy students and pharmacists to support provision of PC services to patients with diabetes and other chronic illnesses.[19]

The article describing the workshop was published in Medical Principle and Practice, which is an international journal of the Kuwait University HSC.[19] It was encouraging for the author to have the article published in this locally recognised journal early in her research journey. This experience inspired the author to implement a series of educational workshops about medicines reconciliation using interactive instructional techniques to pharmacists practising in all governmental hospitals in Kuwait.[10] Medicines reconciliation is a verification process that involves preparing an updated list of all the medications taken by the patient to ensure the accuracy of the patient's medication regimen at each transition of care.[255] This was the research project that the author conducted to complete her masters degree from the University of Dundee. As previously declared, the publications that resulted from that project are not included in this thesis because they were part of the requirement of another degree.[10-12]

4.3 Publications on competency-based pharmacy education:

Key publication 7: Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs (chapter)

Key publication 8: Competency-based education in pharmacy: a review of its development, applications, and challenges (review article)

4.3.1 Background

There is a considerable variation in the healthcare needs of the populations of different countries.[20] The CBE model can permit pharmacy education to adapt to the evolving societal health needs from the pharmacy profession.[20, 21] Although some articles have reported the use of CBE in pharmacy education as early as the 1970s,[256, 257] the model has only received renewed attention in pharmacy due to its growing adoption and use in medical education.[102] This has resulted in a shifted focus by academic pharmacists in the US on the development and assessment of practice competencies of pharmacy graduates.[231, 258, 259] However, there were no previous publications describing the use of CBE in pharmacy in different countries.[21] Therefore, the author wrote a book chapter and a review article to explore this topic.[20, 21] The objective of the chapter was to describe the CBPE model, including defining basic terms/concepts, steps of constructing a competency-based pharmacy curriculum, benefits of CBPE and challenges to its implementation.[20] The objectives of the review article were to provide an overview on the development and applications of CBPE and to describe examples of pharmacy competency frameworks/standards for professional practice from different countries.[21]

4.3.2 Chapter development

As previously explained, the Faculty of Pharmacy adopted CBPE as an educational model since the establishment of the add-on PharmD programme in 2016. Because of her earlier publication in the domain of pharmacy education and active learning methods,[19] the author received an invitation in 2017 to write a chapter in a textbook entitled: Pharmacy education in the twenty first century and beyond: global achievements and challenges. The aim of this textbook was to provide the perspectives of pharmacy academics about recent developments in pharmacy education. The author proposed to the editors of the textbook to write a chapter on CBE in relation to pharmacy and she agreed with them on this topic for the chapter. She thought that writing on CBE would be beneficial as she could share the knowledge obtained from writing the chapter with her colleagues at the Faculty. Since the OBE and CBE models are well established in the US, the author invited Professor Terry L. Schwinghammer to participate in writing the chapter. The author conducted a comprehensive literature review on CBE in relation to pharmacy using different databases and other resources and she drafted a chapter on CBPE.[20] In view of his long experience in pharmacy education, Professor Schwinghammer provided useful insights regarding the content of the chapter, assisted the author to describe the topic from a US perspective and critically revised the chapter. Appendix 2 outlines the role of the collaborator.

4.3.3 Article development

In 2019, one year after publishing the textbook that included the chapter on CBPE, the author came across a call for papers for a special issue on the use of CBE in healthcare professions' education in the Journal of Evaluation in Clinical Practice. The call for papers indicated that a number of healthcare professionals educational programmes

have changed to a model of CBE over the past decade. It welcomed submission of papers focussing on various aspects of CBE. The author felt that publishing a review article in this special issue on CBE would provide a means for a wider dissemination of the information to the international readership than the book chapter. She contacted the editor of the journal and explained to him that she previously published a book chapter on CBE in relation to pharmacy. She expressed to the editor her wish to contribute with a review article on CBPE to represent the perspective of pharmacy profession in this special issue and to provide further information about this model. The editor welcomed her contribution and accepted the proposal for the review article. Afterwards, the author wrote a narrative literature review article on the topic in collaboration with the co-author of the chapter, Professor Terry L. Schwinghammer.[21] Professor Schwinghammer provided his expert opinion on the content of the article and critically revised it as outlined in Appendix 2. In addition to covering the information presented in the chapter, the article sought to provide an overview on the historical development of the CBE model and describe examples on its application in the education and training of pharmacists at different levels.[21] It also aimed to describe the available pharmacy competency frameworks/standards and educational outcomes of pharmacy programmes emphasising competency development.[21] To achieve these objectives, the author searched and reviewed the literature on the topic in PubMed and Scopus databases, as well as other resources (from 1975 to 2019) using a variety of relevant keywords and following a structured systematic search approach.[21] The key findings presented in the two publications on CBPE are collectively described and discussed in the following sections.

4.3.4 Key findings of the publications on CBPE

The literature review indicated that CBE has been increasingly used in pharmacy education at different levels of pharmacists' education and training.[20, 21, 101, 260-264] This was also evident from the increasing attention directed to the development of students' professional competencies within the educational outcomes of pharmacy programmes.[68, 231, 233] As shown in Table 4.1, several foundation and advanced level competency frameworks have been developed in different countries.[21, 87, 237-245] The application of competency standards within undergraduate pharmacy programmes has been predominantly reported from the UK, US, Australia and New Zealand.[265] Some publications also document efforts for competency development of the pharmacy workforce in Croatia, the Netherlands and Finland.[101, 263, 264] Despite the variations in the structure of the identified competency frameworks, they seem to share a common purpose which is the development of practice- and team-ready pharmacists.[20, 21] Globally, the Pharmacy Education Taskforce (PET) which is a partnership among the FIP, the WHO, and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) issued a competency framework in 2012 for the pharmacy profession.[8, 237] Development of the PC competencies is among the pillars of this framework.[237]

Table 4.1: Examples of pharmacy competency frameworks/standards for professional practice and educational outcomes emphasising competency development.*

The Competency Framework/standards or Educational Outcomes (Publication date)	Scope	Structure
The global competency framework for the pharmacy profession by the International Pharmaceutical Federation (FIP) Pharmacy Education Taskforce (PET).[237] (2012)	Covers foundation level (or early years) practice and the competencies of the outcomes of registration (licensing) levels.[237]	Competencies are organised into four domains: 1) pharmaceutical public health, 2) pharmaceutical care, 3) organisation and management, and 4) professional/personal competencies.[237]
The standards for the initial education and training of pharmacists by the General Pharmaceutical Council (GPhC), the UK.[68] (2021, preceded by standards published in 2011)	Describe the learning outcomes that a student or trainee pharmacist must be able to demonstrate when they complete their initial education and training.[68]	The learning outcomes are organised into four domains:1) person-centred care and collaboration, 2) professional practice, 3) leadership and management, and 4) education and research.[68]
The educational outcomes of the American Association of Colleges of Pharmacy (AACP) Center for the Advancement of Pharmacy Education (CAPE) 2013.[231] (2013, preceded by outcomes published in 1992, 1998 and 2004)	Used to guide curriculum planning, delivery and assessment within US Colleges and Schools of Pharmacy.[231] Included as Standards 1-4 in the Accreditation Council for Pharmacy Education (ACPE) 2016 accreditation standards for Doctor of Pharmacy (PharmD) programmes.[231]	Outcomes are structured into four domains: 1) foundational knowledge, 2) essentials for practice and care, 3) approaches to practice and care, and 4) personal and professional development. They are further divided into 15 subdomains of competencies required for pharmacy graduates.[231]
The educational outcomes of the Association of Faculties of Pharmacy of Canada (AFPC).[233] (2017, preceded by outcomes published in 2010)	Outcomes for first professional degree (entry-to-practice) pharmacy programmes describe what graduates can perform at the end the programme.[233]	Seven outcomes defined under the roles of: 1) care provider, 2) communicator, 3) collaborator, 4) leader-manager, 5) health advocate, 6) scholar, and 7) professional, with key competencies under each role.[233]
The professional competencies for Canadian pharmacists at entry-to-practice by National Association of Pharmacy Regulatory Authorities (NAPRA).[240] (2014, preceded by competencies released in 1997 and 2007)	Describe the entry-to-practice competencies required for initial licensing to practise as a pharmacist in Canada.[240]	Competencies distributed into nine categories: 1) ethical, legal and professional responsibilities, 2) patient care, 3) product distribution, 4) practice setting, 5) health promotion, 6) knowledge and research application, 7) communication and education, 8) intra- and inter-professional collaboration, and 9) quality and safety.[240]
A competency framework for pharmacy practitioners: general level framework by the Competency	A general level competency framework that supports development of a pharmacy practitioner from registration to a general practice level.[241]	Competencies are organised into four clusters: 1) delivery of patient care competencies, 2) personal competencies,

Development and Evaluation Group (CoDEG), the UK.[241] (2007, originally developed in 2004)		3) problem-solving competencies, and 4) management and organisation competencies.[241]
Advanced to consultant level framework by CoDEG, the UK.[242] (2009, originally developed in 2004)	A developmental framework for pharmacists progressing to advanced levels of practice.[242]	Includes six clusters: 1) expert professional practice, 2) building working relationships, 3) leadership, 4) management, 5) education, training and development, and 6) research and evaluation.[242]
The core competency framework for pharmacists by the Pharmaceutical Society of Ireland.[243] (2013)	Used to guide pharmacist education and training, both in terms of qualifications for practice and continuing professional development of pharmacists.[243]	Includes six domains: 1) professional practice, 2) personal skills, 3) supply of medicines, 4) safe and rational use of medicines, 5) public health, and 6) organisation/management skills.[243]
The European pharmacy competency framework.[238] (2016)	Used to construct competency profiles for community, hospital and industrial pharmacists in the European context.[238]	Organises competencies into 11 domains distributed into two clusters: 1) personal competencies, and 2) patient care competencies.[238]
Competency framework for hospital pharmacy by the European Association of Hospital Pharmacists (EAHP).[239] (2017)	Describes the competencies needed for hospital pharmacists in European countries.[239]	Competencies are structured into four clusters: 1) patient care and clinical pharmacy skills, 2) medicines and their use, 3) management, and 4) professional competencies.[239]
The national competency standards framework for pharmacists by the Pharmaceutical Society of Australia.[87] (2016, preceded by standards released in 1994, 2001, 2003 and 2010)	Describes the required competencies for pharmacists in all areas of professional practice.[87]	Standards are grouped into five domains: 1) professionalism and ethics, 2) communication and collaboration, 3) medicines management and patient care, 4) leadership and management, and 5) education and research.[87]
An advanced pharmacy practice framework for Australia by the Advanced Pharmacy Practice Framework Steering Committee.[244] (2012)	Details the performance standards required for advanced pharmacy practice.[244]	Based on the CoDEG advanced to consultant level framework and is aligned with the national competency standards framework for pharmacists in Australia.[244]
Competence standards for the pharmacy profession by the Pharmacy Council of New Zealand.[245] (2015, preceded by standards published in 2010)	Used to inform development of undergraduate pharmacy curricula and intern training programmes.[245] Also used to guide professional development of practising pharmacists.[245]	Consist of six domains: 1) professionalism in pharmacy, 2) communication and collaboration, 3) health and medicine management, 4) public healthcare, 5) supply and administration of medicines, and 6) leadership and organisational management.[245]

[*] This table was adapted from: Katoue MG, Schwinghammer TL. Competency-based education in pharmacy: a review of its development, applications, and challenges. J Eval Clin Pract. 2020;26(4):1114-1123 with modifications.

The construction of competency-based curricula begins with identifying the needed practice competencies for pharmacists, which are determined based on societal healthcare needs.[88, 90] An established competency framework can be used as a basis to determine the competencies.[73] Competency frameworks must undergo constant revision to support the evolving role of pharmacists in patient care.[20, 21] Different stakeholders can be consulted to adapt the framework to local healthcare needs.[20, 21] This can be achieved through applying the needs-based educational model.[8, 266] This model comprises four steps: determining the needs, identifying the services provided by pharmacists to meet these needs, defining the required competencies by the pharmacists to provide these services, and then using this information for the construction of a comprehensive educational system to meet these needs.[8, 266] Figure 4.1 illustrates the needs-based educational model. This is followed by charting the identified competencies against the elements of the curriculum (i.e., modules, courses), which are then divided into discrete lessons.[73] To meet the requirements of the modern role of pharmacist in patient care, areas such as therapeutics, communication skills and patient counselling are emphasised in the developed curriculum.[73]

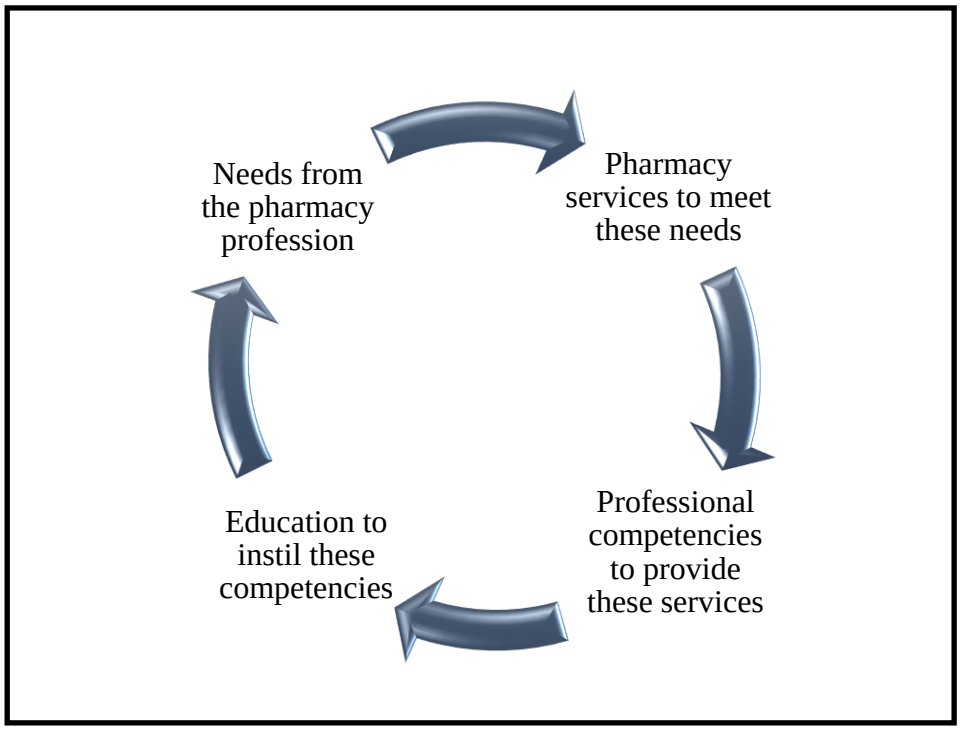


Figure 4.1: The needs-based education development cycle (Adapted from: International Pharmaceutical Federation. Pharmacy Education Taskforce: a global competency framework; 2012. Available from: https://www.fip.org/files/fip/PharmacyEducation/GbCF_v1.pdf. (Accessed 15 May 2021).

The second step of the construction of the curriculum involves the selection of appropriate assessment methods to evaluate the development of students' competencies.[73] This involves determining both summative assessments (assessment *of* learning) and frequent formative assessments (assessment *for* learning) with feedback to support students' development towards achievement of competencies.[20, 21, 73]

Assessment of competency involves the application of several methods, including both self- and performance-based assessments.[91, 265] In Miller's pyramid of assessment of

competence, different assessment methods can be used to assess each of the competency/outcomes.[229] The assessment methods can increase in complexity as the students advance through the curriculum.[73, 90] For example, in the UK, the GPhC standards for initial education and training of pharmacists define learning outcomes levels based on Miller's triangle, and pharmacy curricula must be designed to enable students achieve outcomes at certain levels.[68] Undergraduate pharmacy students/trainees must achieve the learning outcomes specified in the standards to the required level of competence once they successfully complete their initial education and training.[68] On the other hand, pharmacy academia in the US has adopted the use of Entrustable Professional Activities (EPAs) in pharmacy education.[258, 259] The EPAs describe units of professional practice (defined as specific responsibilities or tasks) that trainees are entrusted to execute without the need for direct supervision once they achieved adequate competence.[93, 267] A set of core EPAs for new pharmacy graduates was defined by the American Association of Colleges of Pharmacy (AACP) Academic Affairs Committee.[258, 259] These are divided into six domains: patient care provider, interprofessional team member, population health promoter, information master, practice manager and self-developer.[258, 268] The core EPAs integrate multiple competencies into observable activities to facilitate their assessment and to guarantee the preparedness of pharmacy graduates for practice.[258, 259] For example, a pharmacy graduate must demonstrate ability to collaborate as a member of an interprofessional team.[268] This can be illustrated by performing tasks such as: contributing therapeutic expertise to the team's work, explaining the role and responsibilities of each team members to others using suitable communication skills, communicating the DTPs of a patient to another healthcare professional and developing a shared action plan.[268]

Regardless of the method used, the direct observation of learners while delivering patient care is the cornerstone of competency-based assessment.[91]

The next step in the curriculum construction process involves establishing a teaching-learning environment that can support deep self-regulated learning.[73] Active learning strategies that allow for the application of students' knowledge and skills in clinically-oriented activities must be used throughout the curriculum in addition to lectures that convey basic knowledge.[73] Ample opportunities must be provided for students to practise application of competencies in either simulated or real practice settings in learning experiences that increase in difficulty as they progress through the curriculum.[73, 79] It is also important to establish a safe "feedback culture" within the learning environment to support students' learning.[89, 91, 94]

The curriculum is optimally designed according to the concept of constructive alignment, in which learning outcomes are first determined, followed by aligning the teaching and assessment methods to achieve these outcomes.[73, 269] The CBE model endorses the responsibility of learners to pursue their learning.[94] This develops competencies in independent, self-directed and lifelong learning that support the future professional development of pharmacists.[69, 91]

The last step of the curriculum construction process is curriculum evaluation and improvement.[73] This involves performing critical evaluation, revision and quality improvement of the curriculum under the supervision of the institutional administration

and collaboration of all the involved stakeholders.[73] Information on the achievement of the intended educational outcomes are collected and used to evaluate and enhance the curriculum.[69, 79]

The CBE model offers some potential benefits, but can pose significant challenges and may result in some unintended consequences.[20, 21] This model may be less structured by design with more focus on "personalisation" of students' learning than traditional educational programmes.[102, 270] This would suit well-prepared students but may threaten the academic development of marginal students who may face difficulty in adjusting their learning to a self-paced mode in a curriculum with a flexible timeframe.[270] A number of benefits were documented from the application of CBE in medical education that can be extrapolated to pharmacy education.[20, 21] For example, CBE aims to develop graduates' abilities to serve the needs of their constituents resulting in improved patient care.[88, 89] It explicitly defines professional competence while underscoring the role of assessment in this process.[73, 88, 271] This can provide objective evidence that graduates are professionally competent and improve public confidence in their abilities.[21] It endorses learner-centredness, which increases learner engagement and motivation.[88, 89] It de-emphasises time-based training to offer learners the flexibility to develop competencies at their own pace.[88] This model also supports learning continuum from undergraduate education to pharmacists' lifelong learning, with the aim to achieve, maintain and improve competence throughout their careers.[90]

The challenges that can be associated with the adoption of CBPE include the need to delineate and utilise competencies which can be hard to define, develop, implement and assess.[88, 271] Adopting this model also requires transition from traditional curricula to a new model that requires the application of new teaching and assessment methods.[88] This can be a difficult and time-consuming change process.[73] Moreover, CBE requires significant resources to meet the requirements of curricular design, implementation, teaching and assessment, as well as the upskilling of faculty members.[88, 271]

Transforming a traditional pharmacy curriculum to one adopting CBPE can be challenging, but the success of the initiative depends on the perceived need for change, preparedness of the institution for change and existence of a supportive institutional leadership.[73] Requirements for the success of the transformation include careful planning, implementation and quality improvement of the curriculum, and training of faculty members in relation to CBPE.[20, 21, 73, 92] Faculty members including preceptors must be able to use active learning strategies and competency assessment methods to effectively evaluate pharmacy students and trainees.[91, 272]

After achieving competence upon graduation, pharmacists must continue training to enhancer their practice.[21] This can be accomplished through CPD activities to maintain and improve their professional competencies.[273, 274] Existing competency standards for pharmacy profession can be used as a basis for the choice of CPD activities for pharmacists.[246] Some publications have reported application of the competency-based

approach to curriculum development in pharmacy internship programmes, CPD programmes and postgraduate specialisation programmes.[262-264]

4.3.5 Discussion and impact of the publications on CBPE

The literature review revealed a growing interest in using CBE in health professions education including pharmacy.[20, 21] This model has been mainly adopted and implemented in pharmacy education in developed countries.[20, 21] The publications outlined the relevant terms and main characteristics of the CBE model.[20, 21] These characteristics include: a focus on outcomes, an emphasis on development of abilities, de-emphasis on time-based training, and promotion of learner-centredness.[88, 89] They explained the approach to development and implementation of a competency-based pharmacy curriculum.[20, 21] This approach includes: 1) identification of the required competencies and construction of the curriculum; 2) determination of the assessment methods; 3) creation of an effective teaching-learning environment; and 4) curricular evaluation and improvement.[20, 21, 73]

The review article additionally included a brief description of the historical development of this model.[21] It showed that the CBPE has been applied to the education and training of pharmacists at undergraduate, postgraduate and CPD levels.[21, 101, 260-264] The article also described the scope and structure of pharmacy competency frameworks/standards and educational outcomes of pharmacy programmes with focus on competency development from different countries.[21] These are summarised in Table 4.1.[21]

The two publications highlighted the benefits that can result from adopting CBPE.[20, 21] These include development of graduates' abilities to serve patients' healthcare needs, defining professional competence and providing an objective evidence of learner/practitioner competence.[73, 88, 89, 271] Other benefits include enhancing learners' motivation and engagement in learning, and supporting the continuity of learning throughout pharmacists' careers.[88, 90] Among the challenges to the implementation of CBPE is the difficulty associated with defining and utilising professional competencies.[88] The need to change traditional curricula to this model with specific teaching and assessment requirements can also be a complex and expensive process.[73, 88, 271] To facilitate adoption of CBPE, the publications suggested proper planning, implementation and continuous quality improvement of the curriculum, and a need for institutional support, efficient use of resources and training of faculty members.[20, 21]

4.4 Summary

The adoption and implementation of interactive instructional techniques and novel educational models in pharmacy education can prepare pharmacy students to become PC practitioners who are accountable to both patients and colleagues within healthcare teams. The CBPE model has been implemented in pharmacy education mainly in developed countries.[20, 21] The competency frameworks/standards for the pharmacy profession that have been developed in these countries guide and support pharmacy educational institutions and professional regulatory bodies in the development and sustainability of competent pharmacists who can provide optimal PC services.[87, 237-245] However, most of the identified pharmacy competency frameworks/standards were developed to serve local

needs at multiple countries level. Considering the movement of individuals across countries, this highlights a need for the implementation of global unified guidelines that guarantee the minimum competency standards for pharmacists wherever they practise.

Based on the success of the application of CBPE in various countries as demonstrated in the identified publications, the pharmacy competency frameworks/standards including PC competencies must be periodically revised and updated to respond to the changes in patients' healthcare needs and to maintain pharmacists' provision of quality of care.[20, 21] This should be the responsibility of the pharmacy regulators in consultation with all stakeholders in the pharmacy profession (health authorities, academic institutions, pharmacy professional associations/societies, practising pharmacists, patients and pharmacy students) to ensure the quality of pharmacy education at undergraduate, postgraduate and CPD levels, and provision of optimal PC services.

Implementing active learning strategies is required to provide pharmacy students with the essential practice competencies. These methods are widely used in CBPE curricula which intrinsically support learner-centredness.[88, 89] Transforming a traditional pharmacy curriculum into one adopting CBPE is possible but may be hindered by some challenges.[20, 21] It is important to understand these challenges in order to develop appropriate strategies to facilitate the curricular transformation to the CBPE model.[21]

Most of the available pharmacy competency frameworks/standards for professional practice and educational outcomes of pharmacy programmes highlight the need to develop

pharmacists' competencies to act as effective patient care providers who can practise as active members of healthcare teams. Chapter 5 describes the author's publications on IPE and SBE which can support preparing pharmacy students for providing team-based patient care.[23-26]

Chapter 5: Interprofessional education and simulation-based education for integrating collaborative working to support pharmaceutical care practice

5.1 Introduction

In the modern era of medical practice, patient cases have become increasingly complex which necessitates the collaboration of more than one healthcare professional to provide optimal patient care.[275] The increased chronic diseases burden, rapid advancements in healthcare technology and diversity of the available treatment modalities have made it challenging for physicians to provide effective patient-centred care alone.[276] The transformations of healthcare systems have also created a need for teamwork to achieve effective and efficient delivery of healthcare services.[110] It has been demonstrated that the collaboration of healthcare professionals in patient care enhances coordination, develops good professional relationships and consequently improves patient care and clinical outcomes.[104-106] In contrast, poor teamwork and lack of communication among healthcare professionals or understanding of their professional roles have been linked to failures in patient care.[106]

There is limited literature that describes the working relationships between pharmacists and other healthcare professionals in Kuwait.[210, 277] A previous study showed that most hospital physicians were comfortable with pharmacists performing duties such as patient education but they were less comfortable to accept pharmacists' role in providing direct patient care.[210] In another study, more than half of the sample of physicians and pharmacists reported that they have never practised collaboratively in primary care

settings.[277] Addressing this issue would require reconsideration of the education and training that medical and pharmacy students receive at Kuwait University HSC.

The more the educational experience of healthcare professionals involves the necessary competencies for interprofessional collaboration, the better they will be prepared to assume collaborative practice.[110] Adopting and implementing IPE in healthcare professionals educational programmes help prepare students with these skills, overcome professional silos and improve collaborative and non-hierarchal relationships among the members of healthcare teams.[109, 110] Key international organisations like the WHO and FIP have established that IPE can lead to development of a collaborative practice-ready practitioners, which in turn leads to a strengthened healthcare system, better integrated care, and improved patient safety and health outcomes.[103, 278] Several guidelines were developed to inform development and implementation of IPE in the health institutions in the UK and US.[148, 279]

Collaborative pharmacy practice is defined as "the advanced clinical practice where pharmacists collaborate with other healthcare professionals in order to care for patients, carers and the public".[278] Most of the modern pharmacy competency frameworks that were outlined in Chapter 4 endorse development of interprofessional collaborative skills.[87, 237-245] Pharmacy education responded to these emerging requirements and started to prepare pharmacy students with IPCP skills. For example, the GPhC in the UK recommends that pharmacy courses of the Masters of Pharmacy (MPharm) degree programmes must include opportunities for interaction with other health and social care

professionals in IPE learning experiences starting at an early stage and progressing to more complex interactions.[68] The CAPE educational outcomes which guide curriculum planning, delivery and assessment within US Colleges and Schools of Pharmacy require the pharmacy programmes to prepare pharmacy graduates for interprofessional collaboration.[231] In Canada, the educational outcomes for the first professional degree pharmacy programmes mandate development of a "collaborator role" of the pharmacist.[233] In parallel, the accreditation standards for the professional programmes in pharmacy in these countries reflect these requirements.[68, 232, 234]

Although simple in concept, IPE can be difficult to implement due to several barriers as described in Chapter 1.[117, 118] Among the main barriers to IPE implementation is the diversity of healthcare students from different professions, variation in students' learning needs, professional stereotypes, and lack of interest and enthusiasm of students and faculty members in IPE.[117-121, 280] This would reflect the importance of the engagement of faculty members and students for the successful implementation of IPE to occur.

Most of the countries in the Middle East, including Kuwait are relatively in the early stages of the IPE movement.[24] Plans have been made in Kuwait University HSC to join the global movement towards IPE and collaborative practice.[23, 24] The attitudes towards teaching and learning could be different in the Middle Eastern countries than those expressed by other nations due to variations in culture and educational approaches.[23, 24] Therefore, it was vital to explore the attitudes of health faculty members and students towards IPE before embarking on an IPE initiative in Kuwait.

As mentioned in Chapter 1, simulation has been used in healthcare professionals' education to facilitate learning and practising clinical skills.[136, 141] It has been found to be effective in teaching procedural skills, patient counselling, communication and teamwork skills, and also in the assessment of these skills.[135, 140, 152] This method can bring students from different professions in shared learning experiences,[154] and thus it has been recommended by educational and accrediting organisations to prepare students for collaborative practice.[148, 232, 234]

Several reports document the use of simulation in training pharmacy students in teamwork skills. For example, Kayyali and colleagues[149] reported the integration of simulation sessions into IPE activities among pharmacy and nursing students. Vyas *et al.*[150] implemented HPS to train PharmD students on how to function as members of a multidisciplinary healthcare team in acute clinical situations. Shrader *et al.*[151] implemented a simulated interprofessional rounding experience involving the interaction of pharmacy, medical and physician assistant students with an SP. In these reports, students demonstrated knowledge gain, and/or improvement in self-perceived clinical skills and attitudes towards teamwork, and highly rated the learning experience.[149-151]

The author's publications in relation to IPE and simulation use in healthcare professions' education were the first publications addressing these topics in Kuwait.[10, 11, 23-26] Some of these publications are presented in the following sections and listed in Appendix 5.

5.2 Key publication 9: Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait

5.2.1 Background

The studies described in Chapter 3 indicated that pharmacy students and hospital pharmacists in Kuwait hold positive attitudes towards PC but this practice has been challenged by several barriers including inadequate teamwork among healthcare professionals.[14, 15] A good interprofessional relationship among pharmacists and physicians is required to effectively implement PC.[37, 109] Moreover, deliberate physician-pharmacist collaboration has been consistently associated with improved patient outcomes in a variety of clinical settings.[6, 281, 282]

The Faculties of Medicine and Pharmacy at Kuwait University graduate pharmacy and medical practitioners in Kuwait. Medical students graduate with the Doctor of Medicine (MD) degree after completing the medical curriculum over seven years. Pharmacy students used to graduate with the B Pharm degree after completing their study over five years. Currently, the pharmacy programme is a seven-year entry-to-practice PharmD programme. Medical and pharmacy students complete pre-professional courses during the first common year.[22] Afterwards, students from each profession complete their learning journey with peers from their own profession (uniprofessional education).[22]

Physicians' attitudes towards collaboration with pharmacists have been shown to significantly predict their intention to collaborate with them.[283] The attitudes of the students from the two professions towards collaboration were not investigated in any

previous studies in Kuwait.[22] Examining differences in collaborative attitudes between pharmacy and medical students can provide insights on the extent of perceived collaborative practice in the current educational programmes. The objectives of this study were to determine the attitudes of medical and pharmacy students towards physician-pharmacist collaboration and to examine the differences in attitudes between medical and pharmacy students at early and advanced stages of their academic study.[22] The study also aimed to investigate the views of students about the barriers to this collaboration.[22]

5.2.2 Article development

The author read articles describing the use of the SATP^{2}C for assessment of the attitudes of medical and pharmacy students towards physician-pharmacist collaboration.[111, 112] The author decided to implement this tool in a similar study. She collaborated with Professor Abdelmoneim I. Awad, and Professor Terry L. Schwinghammer to conduct this study as a continuation of the efforts on investigating how to support PC practice in Kuwait. Two faculty members from the Faculty of Medicine participated in this study and assisted in data gathering from medical students. Appendix 2 explains the role of the collaborators. A cross-sectional survey of pharmacy and medical students was conducted in Kuwait University by the end of the academic year 2014-2015.[22] Data were gathered from first-year pharmacy and medical students and advanced students completing the last two professional years of the two programmes (n=467) using a self-administered questionnaire.[22] Only advanced students from the two professions were asked to evaluate the barriers to physician-pharmacist collaboration because these students completed placements in the healthcare system.[22]

5.2.3 Key findings

A total of 385 students completed the questionnaire (response rate 82.4%).[22] Students from both professions expressed overall positive attitudes towards physician-pharmacist collaboration.[22] However, first-year and advanced pharmacy students expressed significantly more positive attitudes towards collaboration than medical students at the same stages ($p<0.001$).[22] Medical students ranked the three top significant barriers to physician-pharmacist collaboration to be: physical separation of pharmacists from patient care areas (70.0%), lack of pharmacists' access to patients' medical record (63.0%), and physicians assuming full responsibility for clinical decision-making (60.8%).[22] Pharmacy students perceived the most significant barriers to this collaboration to be: lack of pharmacists' access to patients' medical record (84.2%), organisational obstacles such as lack of healthcare policy to support pharmacist's role in patient care (83.2%), and physical separation of pharmacists from patient care areas (81.1%).[22] Absence of IPE was rated the fourth-highest barrier to collaboration by both pharmacy (80.0%) and medical (55.2%) students.[22]

5.2.4 Discussion and impact of the publication

This study showed that both pharmacy and medical students advocate physician-pharmacist collaboration.[22] First-year pharmacy students and senior pharmacy students reported significantly more positive attitudes towards physician-pharmacist collaboration than medical students at the same stages.[22] These findings align with results of previous studies in the US and Croatia.[112, 113] Physicians are educated and trained to be independent and accountable for their decisions.[38] Provision of PC expands pharmacist's role into roles

traditionally held by physicians such as managing pharmacotherapy.[37] This can be perceived as a threat to physician's role, thus hindering the development of collaborative practice.[37] In the previous studies assessing the attitudes towards PC, poor communication/coordination with physicians was also identified as barrier to PC practice.[14, 15]

In this study, lack of IPE was reported by medical and pharmacy students among the top barriers to physician-pharmacist collaboration.[22] Providing IPE opportunities as part of health professions' education and training can support development of good pharmacist-physician working relationships and enhance collaborative practice.[109, 110] Therefore, the study proposed offering health sciences students at Kuwait University interprofessional learning opportunities that would ideally span the entire course of their academic study using multiple active learning methods.[22] Consequently, there have been ongoing efforts to develop an IPE curriculum among the health faculties at Kuwait University HSC through the establishment of an IPE committee.[23, 24]

Physical separation of pharmacists from patient care areas was among the highly rated barriers to pharmacist-physician collaboration.[22] Hospital pharmacists have traditionally been performing their duties inside the pharmacies with limited interaction with physicians on the wards.[28] Therefore, the study suggested that pharmacists who possess the required clinical competencies to start working alongside physicians on the wards.[22] This can enable physicians to observe pharmacists executing clinical tasks, thus enhancing their confidence in pharmacists as collaborators in patient care.[22, 210]

Lack of pharmacists' access to patients' medical records was another top perceived barrier to physician-pharmacist collaboration.[22] Paper-based patient medical records were mostly used at the time of the study.[22] Therefore, the study recommended expanding the application of health IT systems such as the EHRs across all healthcare settings.[22]

To overcome the other perceived barriers to collaboration, the study recommended development of national standards of pharmacy practice, clarification of pharmacist job description and provision of sufficient pharmacy staff.[22] It also called for effective collaboration between the Faculty of Pharmacy and Kuwait MoH to expand the systematic implementation of PC practice and ensure proper recruitment of clinical pharmacists across the healthcare system.[22]

Following the publication of this article, two researchers contacted the author by email requesting the questionnaire that was used in this study. The author shared the study questionnaire with these researchers who were former pharmacy students at the Faculty. They were completing their masters degree in Clinical Pharmacy in the UK. They used the questionnaire to assess attitudes of physicians and pharmacists towards physician-pharmacist collaboration in Kuwait for their masters degree research projects. The author also reviewed a similar research article that was conducted in Brazil for the journal of Pharmacy Practice (Granada).[284]

This study highlighted the need to enhance students' training in interprofessional collaboration.[22] This led the author to explore the concept of IPE. As a result of her interest

in this topic and this publication, the author was invited to be part of the IPE committee looking at the development and implementation of IPE at Kuwait University HSC. Next, the author investigated the attitudes of faculty members and health sciences students towards IPE.[23, 24]

5.3 Key publication 10: Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty

5.3.1 Background

As outlined earlier, health students need to be equipped with IPCP skills and IPE facilitates development of these skills.[103, 110] The literature describing the barriers to IPE highlights the effect of the attitudes of faculty members towards IPE on the adoption and implementation of IPE.[117, 118] The positive attitudes of faculty members towards IPE have an influential impact on the success of IPE initiatives.[123] Several studies have assessed the attitudes of faculty members towards IPE and healthcare teams from different countries but none were conducted in Kuwait before.[23, 122-124]

Kuwait University HSC encompasses the main health faculties in the country. In addition to the previously described academic programmes that are offered by Faculty of Medicine and Faculty of Pharmacy, Faculty of Dentistry offers a seven-year programme that leads to the Doctor of Dental Medicine (DMD) degree. The Faculty of Allied Health Sciences offers four-year Bachelor's degree programmes in various allied health professions. The Kuwait University HSC does not include a faculty of nursing. The nursing programme is provided by another independent institution. Health sciences students receive most of

their learning and training using a uniprofessional educational model.[24] The faculty members of Kuwait University HSC faculties are multinationals with diverse educational and training backgrounds.[23] They are composed of academic staff members (professors, associate professors and assistant professors) and academic support staff members (teaching assistants, clinical instructors, lecturers and scientific assistants).[23]

There has been a proposal to develop an IPE curriculum among the different faculties at Kuwait University HSC.[23, 24] It was necessary to determine the attitudes of faculty members towards IPE and healthcare teams in preparation to implement IPE.[23] Therefore, the objectives of this study were to explore the attitudes of faculty members at Kuwait University HSC towards IPE and collaborative practice, their training needs and their views about the barriers to implementing IPE.[23]

5.3.2 Article development

In several earlier publications, the author proposed implementing IPE to enhance pharmacy students' preparation for PC and collaborative practice.[14, 15, 17, 22] The author believed that creating changes in practice must start from the educational preparation that healthcare professionals receive at academic institutions. This resulted in promoting her interest in IPE research. Some instruments such as the ATHCTS, RIPLS were developed and used to assess attitudes towards IPE and collaborative practice in academic institutions in the UK and US, and then were utilised in other countries to evaluate the attitudes of faculty members towards IPE and collaborative practice.[119, 122-124, 181-183] The author decided to investigate the attitudes towards IPE in Kuwait using these tools with

the two collaborators in the earlier studies on PC: Professor Abdelmoneim I. Awad, and Professor Terry L. Schwinghammer.

The Faculty of Pharmacy led institutional efforts to develop an IPE curriculum among Kuwait University HSC faculties by establishing an IPE committee. In view of the author's ongoing research on IPE at that time, she was invited to join the IPE committee. The author served as an active member on that committee. An international IPE expert, Professor Alan Dow from Virginia Commonwealth University, the US was invited by the IPE committee to visit Kuwait to provide consultations on the planned IPE curriculum. The author met Professor Dow and invited him to participate in the IPE research project. Professor Dow accepted the invitation and provided guidance throughout the IPE research project. The role of the three co-authors in the two publications (summarised in this section and the following one) that resulted from this research project is explained in Appendix 2. The first study involved a cross-sectional survey that was conducted among HSC faculty members (n=350).[23] Data were collected from faculty members using a self-administered questionnaire.[23] The author approached the faculty members to explain the objectives of the study and encourage their participation.[23]

5.3.3 Key findings

Two hundred and ten faculty members responded to the questionnaire (response rate 60%).[23] Respondents expressed positive attitudes towards interprofessional healthcare teams, IPE and interprofessional learning in the academic setting (median [IQR] overall attitude for each scale was 4.0 [1.0] on a scale of 5).[23] The findings showed that the overall

attitudes were significantly more positive among assistant professors, faculty members with ≤ 10 years of experience and females ($p<0.05$).[23] Faculty members from Medicine, Pharmacy, and Allied Health Sciences expressed significantly more positive attitudes towards interprofessional healthcare teams compared to Dentistry ($p=0.002$).[23] Most respondents (91.9%) reported their willingness to be trained to implement IPE.[23] The top selected aspects of faculty members' training needs were active learning methods (60.0%), teamwork skills (47.6%) and assessment methods for IPE (41.0%).[23] The majority of respondents (85.7%) ranked small group learning as the preferred teaching method for IPE.[23] The top perceived barriers to IPE implementation were leadership challenges such as lack of administrative support or coordination among faculties (86.6%), curriculum challenges such as difficult integration of IPE into traditional curricula (82.4%), teaching challenges such as lack of faculty members' instructional skills for IPE (81.4%), and resistance to change (80.5%).[23]

5.3.4 Discussion and impact of the publication

This study assessed the attitudes of faculty members from different health professions towards IPE and collaborative practice and their views about the potential barriers to IPE implementation in Kuwait.[23] The findings provided useful insights on how these concepts are perceived in this part of the world, and in particular would assist in development of an IPE curriculum in Kuwait University HSC.[23]

The results indicated that faculty members expressed positive attitudes towards interprofessional healthcare teams and IPE.[23] These findings are consistent with the

results of previous studies from other countries.[123, 124, 285] However, the findings revealed some variations between faculty members based on their characteristics.[23] For example, faculty members at the Faculty of Dentistry expressed less positive attitudes towards interprofessional healthcare teams than did faculty members from other professions.[23] This could be explained by the nature of dentists' practice that may not involve direct interaction with other healthcare professionals all the time.[23] Junior faculty members reported significantly more positive attitudes towards IPE and interprofessional healthcare delivery than did the more senior counterparts.[23] Thus, efforts are needed to improve the attitudes of senior faculty members to these concepts through appropriate training activities.[23] The attitudes towards IPE and healthcare teams were significantly more positive among females than males.[23] This is similar to the findings of some studies,[122, 124] while in another study no significant differences were noted in the attitudes of females and males towards IPE.[123]

The study identified the training needs of the faculty members at Kuwait University HSC in relation to IPE and willingness of most respondents to receive training.[23] Considerable investment in the development of faculty members would be necessary for the proper implementation of IPE initiatives.[286] Potential strategies to achieve that goal include mentoring/coaching of junior faculty members and peer learning.[287]

In this study, faculty members ranked the most challenging barriers to the implementation of IPE to be leadership challenges, curriculum challenges, teaching challenges and resistance to changing the traditional instructional approaches.[23] These barriers are

consistent with the results of previous studies conducted in other countries.[114, 117, 125] The study proposed some solutions to overcome these barriers.[23] These included the development of faculty members in relation to IPE and providing adequate institutional support to overcome any logistical or curriculum challenges.[23] The study also recommended developing local IPE champions who can collaborate with leaders, plan the IPE curriculum and lead faculty members' development efforts.[23] These findings and recommendations can help in the advancement of IPE in Kuwait and possibly other Middle Eastern countries where the interest in IPE has been evolving.[23]

5.4 Key publication 11: Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students

5.4.1 Background

The readiness of students to participate in IPE initiatives depends upon their initial attitudes towards IPE.[119] Assessing students' baseline attitudes towards IPE can also assist educators consider differences in students' values and beliefs when planning for IPE initiatives, thereby promoting positive outcomes.[119, 127] The first paper in this chapter evaluated pharmacy and medical students' opinions about lack of IPE as a potential barrier to physician-pharmacist collaboration.[22] This article expanded the evaluation of the attitudes towards IPE to include other health sciences students to further help inform planning of the IPE curriculum in Kuwait.[24]

The findings of the studies that previously assessed attitudes of health students towards IPE in developed countries,[120, 126-129] and some Middle Eastern countries,[130-132] indicated

that the attitudes of students towards IPE were generally positive. However, the results exposed differences in the impact of students' attributes on their positive attitudes towards IPE, such as age, gender, previous healthcare experience, or the specific professional programme.[127] This supports the need to conduct studies locally prior to planning an IPE curriculum in any institution because results from any study might not be generalisable to other institutions or countries.[119]

The objectives of this study were to explore the attitudes of health sciences students at Kuwait University HSC towards IPE and collaborative practice at different stages of their academic study.[24] The study also aimed to examine the influence of students' attributes (health profession, stage of their academic study and gender) on these attitudes.[24]

5.4.2 Article development

The same research team members collaborated in this study which represented the second phase of the research exploring the attitudes towards IPE at Kuwait University HSC (Appendix 2). A cross-sectional survey of health sciences students at Kuwait University Faculties of Medicine, Dentistry, Pharmacy, and Allied Health Sciences was conducted from May 2015 through May 2016.[24] The survey was distributed to all students in the early (first year), middle (third year), and final year of study at each faculty (n=950).[24] Data were collected using a self-administered questionnaire.[24] The author approached students at the end of major classroom lectures and invited them to voluntarily participate in the study.[24]

5.4.3 Key findings

A total of 770 students completed the questionnaire (response rate 81.1%).[24] Students expressed positive attitudes towards both interprofessional healthcare teams and IPE (median [IQR] overall attitudes were rated as 4.0 [1.0] and 4.0 [2.0], respectively, on a scale of 5).[24] The overall attitudes of pharmacy students towards interprofessional healthcare teams and IPE were significantly more positive than the attitudes reported by students from other health professions ($p<0.001$).[24] Medical students expressed significantly lower attitudes towards both interprofessional healthcare teams and IPE than did students from Pharmacy and Allied Health Sciences.[24] Health students in final years expressed more positive attitudes towards healthcare teams than students in early and middle years, while students in early and final years expressed more positive attitudes towards IPE than students in middle years ($p<0.001$).[24] There were no significant differences in overall attitudes between female and male students towards interprofessional healthcare teams and IPE ($p>0.05$).[24]

5.4.4 Discussion and impact of the publication

This study showed that health sciences students in Kuwait expressed positive attitudes towards interprofessional healthcare teams and IPE.[24] These findings are similar to the results of studies conducted in other countries.[120, 126-130, 132, 288] This indicates that these students would be willing to engage in IPE whenever it is implemented, and supports development of an IPE curriculum that prepares them for collaborative practice.[24]

Pharmacy students reported more positive attitudes towards interprofessional healthcare teams and IPE compared to other health students, reflecting their awareness of the value of interprofessional collaboration.[24] This could be due to the pharmacy curriculum that incorporates PC practice.[14, 33] Consistent with this study, several studies demonstrated that medical students have relatively less positive attitudes towards IPE,[120, 182, 289, 290] and interprofessional collaboration,[291, 292] than other health sciences students. The article recommended addressing medical students' less favourable attitudes towards IPE and collaborative practice to facilitate implementing IPE at Kuwait University HSC.[24]

The results indicated that students' attitudes towards healthcare teams were significantly more positive among students in final years than those in earlier years across all health programmes.[24] This is in alignment with a previous study, in which senior undergraduate health sciences students expressed significantly more positive attitudes towards healthcare teams than junior students.[290] Other studies showed that senior health students expressed significantly less positive attitudes towards healthcare teams and interprofessional collaboration than younger students.[292, 293] Perhaps the experiential training that senior students receive in the HSC faculties during the professional years supports their beliefs in collaborative care.[24]

On the other hand, the attitudes of health sciences students towards IPE were more positive among students in their first and final years compared to students in the middle years.[24] Studies show that most health students start their educational experience with positive attitudes towards IPE that diminish over time.[129, 292] However, clinical practice

then shifts opinions as described above. During the middle years, the curricular emphasis could have been directed to the acquisition of profession-specific knowledge and skills which can result in development of professional identity and less favourable attitudes towards IPE and collaborative practice.[24]

In the present study, first-year students expressed high initial positive attitudes towards IPE.[24] Thus, the study suggested development of IPE experiences among health sciences students early in their academic study.[24] Exposing students to IPE early during their academic career can help avoid the development of professional prejudice.[120] It can also boost students' confidence in communicating with other professions,[128] and motivation to continue learning together.[120] The study also called for a need to enhance students' positive attitudes towards IPE during the middle years.[24] There were no significant differences among female and male students in their attitudes towards interprofessional healthcare teams and IPE as demonstrated in some studies.[24, 130, 288] However, some studies indicated that females displayed more favourable attitudes than males.[120, 129, 290]

The author presented abstracts/posters representing the work of the IPE committee in a number of local conferences as illustrated in Appendix 1. The findings of the two studies assessing attitudes towards IPE provided baseline information to support development and implementation of an IPE curriculum at Kuwait University HSC.[23, 24] They were published in the Journal of Interprofessional Care, a journal that works in partnership with the Centre for the Advancement of Interprofessional Education (CAIPE).[294] The CAIPE is a UK-based, internationally recognised community of practice that is dedicated to

promote collaborative practice by advancing IPE.[294] Moreover, the author was invited by the Journal of Interprofessional Care and Journal of Pharmacy Practice (Granada) to review manuscripts describing preliminary IPE research in health institutions in other countries in the Middle East.

5.5 Key publication 12: Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice

5.5.1 Background

There has been a growing interest in the use of simulation in clinical skills education and training of healthcare professionals.[139-141] Simulation can improve the clinical practices of healthcare professionals which can result in optimal patient care.[295] Therefore, it would be beneficial for healthcare educators to gain the necessary instructional skills to effectively use simulation in clinical teaching.[143]

There were few, if any publications documenting the use of simulation in healthcare professionals' education and training in the Middle Eastern countries, including Kuwait.[25] Healthcare professionals practising in Kuwait are multinationals with diverse educational backgrounds. Nothing was known about how these practitioners would perceive simulation or implement it as an educational method.[25] The objective of this descriptive study was to gauge the early perceptions of healthcare professionals about the use of simulation for teaching clinical skills.[25]

5.5.2 Article development

As described in Chapter 1, a postgraduate programme on Diabetes Care and Education was offered to healthcare professionals in Kuwait as prat of a partnership between the DDI and the University of Dundee.[25] Multidisciplinary healthcare professionals enrolled in that programme.[25] A national clinical skills and simulation centre was also established at DDI in 2011.[25] Among the modules of this postgraduate programme was the Clinical Skills and Simulation for Education and Practice module.[25] This module aimed to promote the use of simulation as an instructional method to enhance safe clinical practice and standards of care.[25] It introduced participants to the educational theories underpinning SBE and different types of simulators.[25] Learning from the module was constructed based on experiential learning theory and self-directed learning of adult learners.[72, 223]

In terms of module delivery as described in Chapter 2, participants were initially requested to study reading materials about simulation.[25] Then, they attended face-to-face teaching sessions at the Clinical Skills Centre at DDI for four days.[25] Afterwards, participants continued with self-directed learning and implemented experiential assignments for their assessment.[25] This involved a project in which participants used simulation for the design and delivery of teaching sessions that had to be video-recorded.[25] Participants also had to submit reports describing the project and a reflective account of their learning experience.[25]

The author undertook this module as part of her enrolment in the programme. The module leads, Professor Jean Ker and Doctor Susan Somerville invited participants who were

interested to collaborate with them in writing an article to describe the module and participants' perceptions. The author accepted the invitation with another module participant. Two cohorts of healthcare professionals who completed the simulation module in 2012 and 2013 participated in this pilot study.[25] Participants' initial perceptions of simulators were collected using a structured questionnaire that they completed during the teaching sessions in the simulation centre.[25] They were asked to rotate through five stations each included a different simulator and to complete a questionnaire composed of open-ended questions.[25] These questions explored participants' understanding about the simulator in relation to its classification, fidelity, possible applications and potential challenges to its use in clinical teaching.[25] The video recordings of participants' teaching sessions, and written reports and reflections on the learning experience were analysed to evaluate participants' ability to correctly use simulation.[25] Then, the author compared these findings and drafted the article. Appendix 2 explains the role of the co-authors in this publication.

5.5.3 Key findings

A total of 37 multidisciplinary healthcare professionals participated in this study.[25] The findings from the questionnaire analysis showed that all participants were able in theory to recognise simulators' classification, fidelity and possible applications.[25] They identified some of the challenges of using these simulators such as the limited availability of equipment, need for technical support for the high-fidelity simulators, lack of realism of part-task trainers, and time and effort needed to train SPs.[25] Results from the analysis of the video recordings of the teaching sessions showed that most participants focussed

on using part-task trainers to teach procedural skills for delivering these sessions.[25] In their written reports and reflections, most participants did not justify the rationale for their choice of the clinical skill or selected simulator to teach that skill.[25] They also did not provide sufficient description of the simulators' classification, fidelity, or reflections on the challenges that they encountered in their use for the sessions.[25]

5.5.4 Discussion and impact of the publication

This study explored the early experiences of healthcare professional educators in the application of simulation.[25] In their responses to the questionnaires, participants were able to correctly identify the classification and fidelity of the different simulators, their applications and potential challenges to their use.[25] The identified challenges are consistent with those previously reported in the literature for the use of different simulators.[135, 140, 142-144] These findings indicate that the assigned self-reading material and face-to-face teaching sessions of the module provided participants with adequate theoretical understanding about the simulators.[25]

The analysis of the video recordings of the teaching sessions revealed that most of the participants used part-task trainers to demonstrate training on procedural skills.[25] The analysis of participants' written reports and reflections exposed their inability to justify the choice of simulators, or to reflect on the challenges they encountered while using them.[25] Therefore, the study exposed a theory-to-practice gap in the initial application of simulation by these healthcare educators.[25] Participants were able to show evidence of knowledge recall by identifying specific facts about simulators in their responses to the

questionnaire.[25] However, they were not able to adequately apply what was learnt into their experiential assignments.[25] According to Bloom's taxonomy, participants could only achieve the lowest domain of learning (knowledge) but were not able to achieve the higher domains.[228]

The study suggested that both deliberate practice and provision of adequate mentorship for these educators can enhance their competence in the use of simulation.[25] Deliberate practice involves intense repetitive performance of a cognitive or psychomotor skill in a controlled setting along with rigorous skill assessment and feedback which gradually lead to improved performance.[136, 296] The article recommended that the educators must be supported to enable them master, refine and maintain their instructional skills in relation to the use of simulation.[25]

This article was the first to be published about SBE in Kuwait.[25] The author presented these findings in local conferences as illustrated in Appendix 1. As a result of this publication, the author developed an interest in SBE. Later on, she investigated the use of simulation in the development of CE activity for pharmacists and explored their perceptions about simulation to complete her MSc degree research project at the University of Dundee.[10, 11] The author also reviewed articles about simulation use in pharmacy and health professions education for journals such as the American Journal of Pharmaceutical Education, Clinical Teacher and Saudi Pharmaceutical Journal. This aided in enhancing her experience in relation to SBE and encouraged her to implement simulation to train pharmacy students on team-based patient care as described next.

5.6 Key publication 13: "As-if": a tool for experiencing team-based care

5.6.1 Background

As outlined in Chapter 1, the Faculty of Pharmacy developed an add-on PharmD programme in 2016. This programme was intended to prepare clinical pharmacists who can provide direct patient care in collaboration with other members of healthcare teams.[26] As indicated earlier, students' participation in IPE activities can help them understand the roles and responsibilities of other healthcare professionals, practise communication with each other, and build positive attitudes towards collaborative practice.[107, 108] However, IPE has not yet been implemented at Kuwait University HSC since the onset of the PharmD programme.[26]

As mentioned earlier, simulation has been widely used in healthcare professionals' education, including pharmacy education to improve teamwork and interprofessional communication skills.[145, 148-151] Therefore, the author has been conducting simulation-based sessions to train students enrolled in the add-on PharmD programme about team-based care.[26] These sessions were described in "Insights" article in the Clinical Teacher Journal.[26] The objective of the article was to describe these simulation-based sessions and to provide a reflection on this educational initiative.[26]

5.6.2 Article development

Starting from 2017, simulation-based sessions have been developed and implemented to demonstrate team approach to patient care to PharmD students.[26] These sessions map the necessary interprofessional collaboration competencies.[26] They involve students'

presentations and role-play to facilitate students' learning about the value of team-based care, as well as the roles and responsibilities of different healthcare professionals in the healthcare team.[26]

Teams composed of five to six students are requested to present team-based care for the management of patients with a specific disease condition.[26] Based on a literature search, students prepare a brief lecture to the class about team-based care and its benefits on patient outcomes, and the roles and responsibilities of different healthcare professionals in management of the disease.[26] Afterwards, students present a role-play based on a case study scenario that demonstrates the roles of a pharmacist, other healthcare professionals and a patient/caregiver in the context of that disease.[26]

5.6.3 Discussion and utility of the publication

The simulation-based sessions have been providing a viable alternative in view of the slow HSC-wide efforts to implement actual IPE among the health faculties.[26] In these sessions, simulation is implemented to help pharmacy students understand the roles of the pharmacist and other healthcare professionals in patient care and also to appreciate the value of team-based care.[26]

The sessions permit pharmacy students to consider themselves *as-if* they were in the position of different healthcare professionals to learn about collaborative practice.[26] As described in Chapter 1, simulation exercises must mirror actual practice experiences to enable students suspend disbelief and interact with an SP and/or other healthcare

professionals *as-if* they are in a real scenario.[145] Integrating the "*as-if*" concept and suspending disbelief are vital to improve the fidelity of simulation and promote its effectiveness for learning.[297] The article reported students' enjoyment about the role-play activity and positive feedback about the simulation-based sessions.[26]

In advance of the efforts to implement IPE at Kuwait University HSC, these simulation-based sessions have served as a valuable exercise to instill in students the necessary competencies for providing collaborative practice.[26] Sharing this experience with other clinical teachers may help them use simulation for training healthcare students on team-based patient care when IPE is not feasible.[26]

5.7 Summary

Establishing interprofessional collaboration between pharmacist and other healthcare professionals, especially physicians is essential to implement PC practice.[36, 37, 109] The best educational approaches to nurture students' positive attitudes towards collaborative practice would be through their engagement in IPE activities.[103, 110] Assessing the attitudes of health faculty members and students towards IPE is vital to identify their willingness to be engaged in future IPE initiatives. Elements required for the successful implementation of IPE include the promotion of positive attitudes and collaborative professional culture among the different health professions, appropriate planning of the IPE curriculum, effective institutional leadership to overcome any obstacles, fiscal support, and good investment in the development of faculty members in relation to IPE.[23]

Effective training of health students and practitioners is essential for them to acquire, develop and maintain a set of clinical skills that are required for optimal practice and best patients' outcomes.[141] Simulation is an effective instructional technique that has been increasingly used in the education and training of the health professions to support achievement of professional competence.[136, 141] It has been found useful in training pharmacy students on team-based care even in the absence of actual IPE opportunities.[26]

Pharmacy educators must master new instructional skills and embrace innovative educational interventions to support students' development of the required professional competencies. Both IPE and SBE are valuable educational strategies that must be explored further and thoughtfully implemented to prepare pharmacy students to become practice- and team-ready PC practitioners.

Chapter 6: Conclusions

The publications presented in this thesis represent the published outputs of the author over almost ten years. The PC research publications showed that pharmacy students and hospital pharmacists in Kuwait have positive attitudes towards PC practice.[14, 15] These studies also revealed several professional, organisational and technical barriers to PC practice.[14, 15]

The author conducted a qualitative research to investigate PN therapy as a special case to explore the extent of PC provision in this specialised pharmacy service.[16, 17] This research revealed the limited clinical role of pharmacists in this area and lack of NSTs at hospitals.[16, 17] The author highlighted the evidence supporting the positive impact of pharmacists' provision of PC services for the management of patients receiving PN support in the review article that she subsequently published.[18]

The author then investigated various educational development strategies to support PC provision. She experimented the use of active learning methods in implementing a workshop to enhance pharmacy students' patient counselling skills.[19] The workshop improved students' perceived competencies for counselling and was well received by students.[19] This supported expanding the use of active learning methods in pharmacy education to enhance pharmacists' preparation for PC practice.[19] She reviewed the available literature about CBPE and showed that this model can offer academic pharmacy a means to prepare pharmacists with the required practice competencies to meet societal healthcare needs.[20, 21]

The author also explored other educational strategies to prepare health students for collaborative practice and to support PC practice. She investigated the attitudes of medical and pharmacy students towards physician-pharmacist collaboration.[22] In this study, lack of IPE was identified among the top significant barriers to collaboration.[22] Earlier findings from PC research and the studies exploring PN practices highlighted lack of teamwork among healthcare professionals as a barrier to PC practice.[14-17] This led the author to focus on IPE as a potential solution to meet the need for collaboration-ready healthcare workforce in Kuwait.[14, 15, 17, 22] The publications on IPE showed that the faculty members and students at Kuwait University HSC hold overall positive attitudes towards interprofessional healthcare teams and IPE.[23, 24] This research supported development of an IPE curriculum that starts during the early stages of students' learning and continues throughout the entire course of their academic study.[24] It also highlighted areas of faculty training needs and their perceived barriers to IPE implementation.[23] These findings can inform the development of the IPE curriculum in Kuwait University HSC and in other countries that are similarly interested in the adoption and implementation of IPE.[23, 24]

The author also developed instructional skills related to simulation and conducted a research to explore the early perceptions of healthcare professionals about the use of simulation for clinical teaching.[25] This study suggested a need for deliberate practice and adequate mentorship for educators to develop competence in simulation use for clinical teaching.[25] Then, the author developed simulation-based training sessions to train pharmacy students about team-based patient care at a time when an actual IPE was lacking.[26]

The publications presented in this thesis provided recommendations to overcome the identified barriers to PC and improve the educational preparation of pharmacists to adopt this practice model. Among the suggested solutions were: establishing national pharmacy competency framework or standards of practice for the profession to ensure the excellence of pharmacy education and practice.[14, 22] The Faculty of Pharmacy and local pharmacy regulatory authorities must collaborate to prepare pharmacy students with the required PC competencies and to address the training needs of pharmacist practitioners. This would necessitate establishing a systematic implementation of PC services across all healthcare settings and standardised practices in specialised pharmacy practice areas such as PN to optimise the quality of patient care. There were also recommendations for incorporating innovative educational models and instructional techniques such as CBE, IPE and SBE into pharmacy students' education and training to prepare them to become practice- and collaboration ready pharmacists upon graduation.[14, 15, 17, 20-24, 26] This would require institutional leadership support for initiating the required changes, management of changes, continuous quality improvement of the pharmacy curriculum based on practice needs, proper funding and dedication of the resources, and adequate training and commitment of faculty members to achieve these changes.

Although these studies were the first to address these topics in Kuwait, they were not without limitations. The survey-based research studies resulted in respondents' self-reporting of attitudes, perceptions of preparedness or confidence which may not reflect respondents' actual competence.[14, 15, 22-24] Another possible limitation is that respondents could have provided socially desirable responses to the survey items. An additional

limitation is the cross-sectional nature of these studies that may not reflect potential changes in respondents' beliefs over time. A potential limitation of the qualitative research that was used in the PN studies is the participants' self-reporting of PN practices.[16, 17] Moreover, results cannot be generalisable to other countries or settings. The descriptive studies were limited by the short timeframe of the educational interventions which restricted the long-term evaluation of the impact of training.[19, 25, 26] Most of the evaluations performed were limited to level 1 of the Kirkpatrick's model.[197] The published narrative literature reviews may not represent a high level of scientific evidence as systematic literature reviews.[199] However, the author attempted to prepare these reviews by following structured, systematic literature search strategies to reduce bias in the selection of the presented evidence.[18, 21, 201]

Most of this research was at the stage of assessment of needs or baseline attitudinal foundations or implementing pilots of educational interventions. Nevertheless, the research journey has developed the author's various social research skills including quantitative and qualitative pharmacy research skills. The author developed excellent abilities to formulate research questions, build collaboration with expert co-authors, perform literature search to identify validated survey tools, administer and conduct surveys and interviews, perform quantitative and qualitative data analysis and interpretation, and lastly report the findings through academic writing. The author also identified useful educational strategies that have been implemented in other countries and investigated these topics to help improve pharmacy education in Kuwait. This has supported her to evolve as a pharmacy educator.

The author's research was mainly focussed on assessing stakeholders' perceptions, attitudes, perceived barriers and needs assessment. However, most of these research studies were at the stage of adaptations of studies conducted in other countries, importing the survey tools and implementing them in Kuwait. Thus, the author needs to develop her research skills beyond investigating stakeholders' perceptions and needs assessment to conduct research studies from inception to execution and evaluation post implementation. The author also needs to consider developing innovative educational concepts and to investigate novel research ideas. Future research directions may include studies to evaluate the impact of PC services on the quality of care and patients' clinical outcomes. Another possible area of research may include further evaluation of the impact of applying active learning strategies on the education and training of pharmacy students, trainees and practitioners. Thus, future work should have two goals, investigating new research topics but also evolving the author's research skills as a researcher.

Nevertheless, as a result of this research journey, the author has initiated a dialogue on several educational topics in Kuwait within her faculty and beyond. She has become an expert in these fields and is recognised by relevant international journals as a reviewer. Her research output has also been appreciated at a regional level. Furthermore, the author had several opportunities to assist researchers in different countries to conduct similar research in their settings over the past years. Indeed, that was the most valuable and rewarding aspect of this research journey.

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Appendices

Appendix 1: Full Publication List and Other Academic Achievements of the Author (Updated to August 2021)
With the Key Publications presented in this PhD Thesis Highlighted

Journal Articles

1. **Katoue MG**, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students. J Interprof Care. 2022;36(1):117-126.

2. **Katoue MG**, Somerville SG, Barake R, Scott M. The perceptions of healthcare professionals about accreditation and its impact on quality of healthcare in Kuwait: a qualitative study. J Eval Clin Pract. 2021;27(6):1310-1320.

3. **Katoue MG**. Enablers and challenges to pharmacy practice change in Kuwait hospitals: a qualitative exploration of pharmacists' perceptions. J Eval Clin Pract. 2021;27(2):272-279.

4. **Katoue MG**, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty. J Interprof Care. 2021;35(2):208-216.

5. **Katoue MG**. "As-If": a tool for experiencing team-based care. Clin Teach. 2020;17(6):723-725.

6. **Katoue MG**, Schwinghammer TL. Competency-based education in pharmacy: a review of its development, applications, and challenges. J Eval Clin Pract. 2020;26(4):1114-1123.

7. Ozdilekcan C, Ozdemir T, Turkkani MH, Sur HY, **Katoue MG**. The association of body mass index values with severity and phenotype of sleep-disordered breathing. Tuberk Toraks. 2019;67(4):265-271.

8. **Katoue MG**, Ker J. Pharmacists' experiences and perceptions about simulation use for learning and development of clinical skills in Kuwait. Int J Clin Pharm. 2019;41(6):1451-1461.

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12. **Katoue MG**. Role of pharmacists in providing parenteral nutrition support: current insights and future directions. Integr Pharm Res Pract. 2018;7:125-140.

13. **Katoue MG**, Ker J. Implementing the medicines reconciliation tool in practice: challenges and opportunities for pharmacists in Kuwait. Health Policy. 2018;122(4):404-411.

14. **Katoue MG**, Awad AI, Al-Jarallah A, Al-Ozairi E, Schwinghammer TL. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait. Pharm Pract (Granada). 2017;15(3):1029.

15. **Katoue MG**, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait. Pharm Pract (Granada). 2016;14(2):680.

16. **Katoue MG**, Al-Taweel D, Matar KM, Kombian SB. Parenteral nutrition in hospital pharmacies. Int J Health Care Qual Assur. 2016;29(6):664-674.

17. **Katoue MG**, Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice. Scott Med J. 2015;60(4):176-181.

18. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. Int J Clin Pharm. 2014;36(6):1170-1178.

19. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care education in Kuwait: pharmacy students' perspectives. Pharm Pract (Granada). 2014;12(3):411.

20. **Katoue MG**, Al Haqan A. Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students. Med Princ Pract. 2013;22(5):489-494.

21. **Katoue MG**, Awad AI, Kombian SB. Role of community pharmacists in the prevention and management of the metabolic syndrome in Kuwait. Int J Clin Pharm. 2013;35(1):57-64.

22. **Katoue MG**, Khan I, Oriowo MA. Pregnancy-induced modulation of calcium mobilisation and down-regulation of Rho-kinase expression contribute to attenuated vasopressin-induced contraction of the rat aorta. Vascul Pharmacol. 2006;44(3):170-176.

23. **Katoue MG**, Khan I, Oriowo MA. Increased expression and activity of heme oxygenase-2 in pregnant rat aorta is not involved in attenuated vasopressin-induced contraction. Naunyn Schmiedebergs Arch Pharmacol. 2005;372(3):220-227.

Book Chapters:

Katoue MG, Schwinghammer TL. Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs. In Fathelrahman AI, Ibrahim MI, Alrasheedy AA, Wertheimer AI, editors. Pharmacy education in the twenty first century and beyond: global achievements and challenges. London: Elsevier Academic Press; 2018.

Conference Abstracts/Posters/Oral Presentations:

1. **Katoue MG**, Ker J. Simulation for developing clinical skills: a mixed method study exploring pharmacists' experiences and perspectives. An abstract/poster presented at the 25th Kuwait University HSC Poster Conference, March 2021.

2. **Katoue MG**, Awad AI, Al-Jarallah A, Al-Ozairi E, Schwinghammer TL. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait. An abstract/poster presented at the 24th Kuwait University HSC Poster Conference, March 2019.

3. **Katoue MG**, Ker J. Simulation for developing clinical skills: a mixed-method study exploring pharmacists' experiences and perspectives. An abstract/poster presented at the seventh Kuwait International Pharmacy Conference (KIPC 2019), March 2019.

4. **Katoue MG**, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait. An abstract/poster presented at the 23rd Kuwait University HSC Poster Conference, March 2018.

5. **Katoue MG**, Baghdady M, Rassafiani M, Al-Jafar E, Bouzubar F, Moreau P. Interprofessional Education Working Group, Health Sciences Centre, Kuwait University. Development of competency-based interprofessional education

curriculum at the Health Sciences Centre of Kuwait University. An abstract/poster presented at the 22nd Kuwait University HSC Poster Conference, March 2017.

6. **Katoue MG**, Baghdady M, Rassafiani M, Al-Jafar E, Bouzubar F, Moreau P. Interprofessional Education Working Group, Health Sciences Centre, Kuwait University. Development of competency-based interprofessional education curriculum at the Health Sciences Centre of Kuwait University. An abstract/poster presented at the sixth Kuwait International Pharmacy Conference (KIPC 2017), February 2017.

7. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care education in Kuwait: pharmacy students' perspectives. An abstract/poster presented at the 21st Kuwait University HSC Poster Conference, May 2016.

8. **Katoue MG**, Al-Taweel D, Matar KM, Kombian SB. Parenteral nutrition in hospital pharmacies in Kuwait: exploring the practices and identifying opportunities for quality improvement. An abstract and an oral presentation presented at the Second Kuwait International Conference on Life Sciences (KICLS), Kuwait University College of Life Sciences, April 2016.

9. **Katoue MG**. Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals in Kuwait: exploring the challenge of integrating theory into educational practice. An abstract/poster presented at Kuwait International Medical Education Congress, Kuwait University Faculty of Medicine, February 2016.

10. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in hospitals of Kuwait: pharmacists' attitudes and perceived preparedness. An abstract/poster presented at the 20th Kuwait University HSC Poster Conference, May 2015.

11. **Katoue MG**. Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals in Kuwait: exploring the challenge of integrating theory into educational practice. An abstract and oral presentation at the First GCC Conference on Evidence-based Healthcare Professional Development, October 2014.

12. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in hospitals of Kuwait: pharmacists' opinions and perceived barriers. An abstract/poster presented at the 19th Kuwait University HSC Poster Conference, May 2014.

13. **Katoue MG**, Awad AI, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. An abstract/poster presented at the First Scientific Poster Day, Kuwait University, March 2014.

14. **Katoue MG**, Iblagh N, Somerville S, Ker J. Exploring the theory-to-practice gap in the use of simulators by novice educators. An abstract/poster presented at the Second International Gulf Clinical Skills and Simulation Conference, Dasman Diabetes Institute, Kuwait, September 2013.

15. **Katoue MG**. Al-Haqan A. Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students. An abstract/poster presented at the 18th Kuwait University HSC Poster Conference, May 2013.

16. **Katoue MG**. A workshop on the role of pharmacists in patient counselling about antidiabetic medications. A poster and an oral presentation at the Future of Diabetes Care and Education Discovery Conference. Dasman Diabetes Institute, May 2012.

17. **Katoue MG**, Al-Haqan A, Abdel-Meguid S. Evaluation of a workshop on management of asthma to the final year pharmacy students. An abstract/poster presented at the 17th Kuwait University HSC Poster Conference, May 2012.

18. **Katoue MG**, Awad AI, Kombian SB. Role of community pharmacists in the prevention and management of metabolic syndrome in Kuwait. An abstract/poster presented at the 16th Kuwait University HSC Poster Conference, May 2011.

Peer Reviews

The author has been serving as a reviewer for the following international journals:

1. International Journal of Clinical Pharmacy.
2. Research in Social and Administrative Pharmacy.
3. Journal of Clinical Pharmacy and Therapeutics.
4. Pharmacy Practice (Granada).
5. Integrated Pharmacy Research and Practice.
6. Journal of Pharmaceutical Health Services Research.
7. European Journal of Hospital Pharmacy.
8. Saudi Pharmaceutical Journal.
9. American Journal of Pharmaceutical Education.
10. The Clinical Teacher.
11. Journal of Interprofessional Care.
12. Simulation & Gaming.
13. Advances in Medical Education and Practice.
14. Health Policy (Amsterdam, Netherlands).
15. Journal of Evaluation in Clinical Practice.
16. Health and Social Care in the Community.
17. Primary Care Diabetes.
18. BMC Public Health.
19. Current Pediatric Research.
20. The Journals of Allied Academies.

Academic Awards:

- The author was awarded the "Best Student Project Presentation Award" by the Director General of the Dasman Diabetes Institute, during the Future of Diabetes Care and Education Discovery Conference. Dasman Diabetes Institute, May 2012.

Learning Events:

The author delivered the following learning events:

- A workshop on "Management of Chronic Asthma" for final year pharmacy students. Kuwait University Faculty of Pharmacy, November 2011.

- A workshop on "Patient Counselling about Antidiabetic Medications" for final year pharmacy students. Kuwait University Faculty of Pharmacy, February 2012.

- A workshop titled "Facilitation" for a group of academic support staff at Kuwait University Faculty of Pharmacy, June 2012.

- A workshop titled: "Pharmacological Management of Diabetes" for a group of healthcare professionals during the Dasman Dundee Discovery Conference, Dasman Diabetes Institute, October 2013.

- A series of workshops on "Medicines Reconciliation" for pharmacists working in several governmental hospitals across Kuwait (a total of eleven workshops), January-June 2015.

- A seminar titled: "Parenteral Nutrition Practices in Hospital Pharmacies in Kuwait" at Kuwait Cancer Centre, Al Sabah Medical Area, Kuwait, June 2016.

Appendix 2: The Author's Input into the Key Publications Described in this Thesis and the Roles of the Author and Co-authors

1. Pharmaceutical care education in Kuwait: pharmacy students' perspectives

Maram Gamal Katoue, Abdelmoneim I. Awad, Terry L. Schwinghammer, Samuel B. Kombian

The full citation of this article:

Katoue MG, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care education in Kuwait: pharmacy students' perspectives. Pharm Pract (Granada). 2014;12(3):411.

Description of the roles of the author and co-authors: Maram Katoue designed the study, collected the data and entered the data into SPSS. She interpreted the findings and wrote the manuscript. Professor Awad participated in the design of the study, analysed the data and critically revised the manuscript. Professor Schwinghammer participated in the design of the study and critically revised the manuscript. Professor Kombian participated in the design of the study and critically revised the manuscript.

2. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives

Maram Gamal Katoue, Abdelmoneim I. Awad, Terry L. Schwinghammer, Samuel B. Kombian

The full citation of this article:

Katoue MG, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. Int J Clin Pharm. 2014;36(6):1170-1178.

Description of the roles of the author and co-authors: Maram Katoue designed the study, collected the data and entered the data into SPSS. She interpreted the findings and wrote the manuscript. Professor Awad participated in the design of the study, analysed the data and critically revised the manuscript. Professor Schwinghammer participated in the design of the study and critically revised the manuscript. Professor Kombian participated in the design of the study and critically revised the manuscript.

3. Parenteral nutrition in hospital pharmacies.

Maram Gamal Katoue, Dalal Al-Taweel, Kamal M. Matar, Samuel B. Kombian

The full citation of this article:

Katoue MG, Al-Taweel D, Matar KM, Kombian SB. Parenteral nutrition in hospital pharmacies. Int J Health Care Qual Assur. 2016;29(6):664-674.

Description of the roles of the author and co-authors: Maram Katoue designed the study and collected the data. She conducted face-to-face semi-structured interviews with the head TPN pharmacists. She transcribed the interviews verbatim and analysed the transcripts for content. She interpreted the findings and wrote the manuscript. Dr. Al-Taweel participated in data analysis and reviewed the manuscript. Dr. Matar participated in the design of the study and reviewed the manuscript. Professor Kombian participated in the design of the study and reviewed the manuscript.

4. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care

Maram Gamal Katoue, Dalal Al-Taweel

The full citation of this article:

Katoue MG, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait. Pharm Pract (Granada). 2016;14(2):680.

Description of the roles of the author and co-author: Maram Katoue designed the study and collected the data. She conducted in-depth, face-to-face semi-structured interviews with the head TPN pharmacists. She transcribed the interviews verbatim and analysed the transcripts using thematic analysis. She interpreted the findings and wrote the manuscript. Dr. Al-Taweel participated in data analysis and writing the results. She critically revised the manuscript.

5. **Role of the pharmacist in providing parenteral nutrition support: current insights and future directions**

Maram Gamal Katoue

The full citation of this review article:

Katoue MG. Role of pharmacists in providing parenteral nutrition support: current insights and future directions. Integr Pharm Res Pract. 2018;7:125-140.

Description of the role of the author: Maram Katoue conducted a comprehensive literature review on the topic using PubMed database (from 1975 to 2017) and revised the relevant standards of practice and clinical guidelines. She analysed and organised the results. Then, she independently wrote and revised the manuscript to provide an overview on the different roles and services that pharmacists provide in relation to PN support.

6. **Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students**

Maram Gamal Katoue, Asmaa Al Haqan

The full citation of this article:

Katoue MG, Al Haqan A. Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students. Med Princ Pract. 2013;22(5):489-494.

Description of the roles of the author and co-author: Maram Katoue participated in the design and delivery of the workshop. She prepared the questionnaires that were used to assess the impact of the workshop on students' knowledge about antidiabetic medications and confidence about patient counselling. She also prepared the evaluation sheet that was used to evaluate the workshop. Maram Katoue analysed the data and wrote the manuscript. Dr. Al Haqan participated in the design and delivery of the workshop and in preparing the instruments used. She reviewed the manuscript.

7. Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs

Maram Gamal Katoue, Terry L. Schwinghammer

The full citation of this book chapter:

Katoue MG, Schwinghammer TL. Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs. In Fathelrahman AI, Ibrahim MI, Alrasheedy AA, Wertheimer AI, editors. Pharmacy education in the twenty first century and beyond: global achievements and challenges. London: Elsevier Academic Press, 2018.

Description of the roles of the author and co-author: Maram Katoue conducted a comprehensive literature review on CBPE using different databases (PubMed and Scopus databases), textbooks and other electronic resources. She reviewed the literature and wrote the chapter to describe the CBPE model. Professor Schwinghammer provided guidance regarding the content of the chapter and critically revised the chapter.

8. Competency-based education in pharmacy: a review of its development, applications, and challenges

Maram Gamal Katoue, Terry L. Schwinghammer

The full citation of this review article:

Katoue MG, Schwinghammer TL. Competency-based education in pharmacy: a review of its development, applications, and challenges. J Eval Clin Pract. 2020;26(4):1114-1123.

Description of the roles of the author and co-author: Maram Katoue conducted a comprehensive literature review on CBPE using PubMed and Scopus databases, as well as other electronic resources (from 1975 to 2019). She reviewed the literature and wrote the review article to provide an overview on the development and applications of CBPE and to describe examples of pharmacy competency frameworks/standards for professional practice from different countries. Professor Schwinghammer provided expert opinion on the content of the review article and critically revised the article.

9. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait

Maram Gamal Katoue, Abdelmoneim I. Awad, Aishah Al-Jarallah, Ebaa Al-Ozairi, Terry L. Schwinghammer

The full citation of this article:

Katoue MG, Awad AI, Al-Jarallah A, Al-Ozairi E, Schwinghammer TL. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait. Pharm Pract (Granada). 2017;15(3):1029.

Description of the roles of the author and co-authors: Maram Katoue designed the study and collected the data. She interpreted the findings and wrote the manuscript. Professor Awad participated in the study design, analysed data and critically revised the manuscript. Dr. Al-Jarallah participated in data collection and reviewed the manuscript. Dr. Al-Ozairi participated in data collection and reviewed the manuscript. Professor Schwinghammer participated in the study design and critically revised the manuscript.

10. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty

Maram Gamal Katoue, Abdelmoneim I. Awad, Alan Dow, Terry L. Schwinghammer

The full citation of this article:

Katoue MG, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty. J Interprof Care. 2021;35(2):208-216.

Description of the roles of the author and co-authors: Maram Katoue designed the study, collected the data and entered the data into SPSS. She interpreted the findings and wrote the manuscript. Professor Awad participated in the design of the study, analysed the data and critically revised the manuscript. Professor Dow participated in the design of study and critically revised the manuscript. Professor Schwinghammer participated in the design of the study and critically revised the manuscript.

11. Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students

Maram Gamal Katoue, Abdelmoneim I. Awad, Alan Dow, Terry L. Schwinghammer

The full citation of this article:

Katoue MG, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students. J Interprof Care. 2022;36(1):117-126.

Description of the roles of the author and co-authors: Maram Katoue designed the study and collected the data. She interpreted the findings and wrote the manuscript. Professor Awad participated in the design of the study, analysed the data and critically revised the manuscript. Professor Dow participated in the design of the study and critically revised the manuscript. Professor Schwinghammer participated in the design of the study and critically revised the manuscript.

12. Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice

Maram Gamal Katoue, Nadia Iblagh, Susan Somerville, Jean Ker

The full citation of this article:

Katoue MG, Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice. Scott Med J. 2015;60(4):176-181.

Description of the roles of the author and co-authors: Maram Katoue participated in the design of the study. She analysed the data from the questionnaires. She interpreted and compared the overall findings of the study, and she wrote the manuscript. Miss Iblagh participated in data analysis from the questionnaires and she reviewed the manuscript. Dr. Somerville participated in the design of the study. She analysed the data from the video recordings and written reflections prepared by the module participants, and she critically revised the manuscript. Professor Ker participated in the design of the study and analysis of the video recordings and written reflections, and she critically revised the manuscript.

13. “As-If”: a tool for experiencing team-based care

Maram Gamal Katoue

The full citation of this article:

Katoue MG. “As if”: a tool for experiencing team-based care. Clin Teach. 2020;17(6):723-725.

Description of the role of the author: Maram Katoue independently designed and implemented simulation-based sessions to train PharmD students on team-based care. She wrote and revised the “Insights” article. In this article, she explained why the simulation-based sessions were developed, outlined the learning outcomes, and provided a brief description of the sessions. She also reflected on this educational initiative in the article.

Appendix 3: Key Publications Described in Chapter 3

The key publicaitons have been removed from this electronic copy of the thesis for copyright protection. A list of the publicaitons presented in Chapter 3 and their electorinc links and copyright information are provided below:

1. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care education in Kuwait: pharmacy students' perspectives. Pharm Pract (Granada). 2014;12(3):411.
   DOI: 10.4321/s1886-36552014000300002
   An open access article available from:
   https://scielo.isciii.es/pdf/pharmacy/v12n3/original2.pdf (Accessed 2 July 2021).
   The author retains the copyright of the article which is licensed under a Creative Commons Attribution License (CC-BY-NC-ND) that permits others to share the work with an appropriate credit to the authors and the initial publication of the aticle in Pharmacy Practice.

2. **Katoue MG**, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. Int J Clin Pharm. 2014;36(6):1170-1178.
   DOI: 10.1007/s11096-014-0013-z
   Copyright © 2014, Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie.

3. **Katoue MG**, Al-Taweel D, Matar KM, Kombian SB. Parenteral nutrition in hospital pharmacies. Int J Health Care Qual Assur. 2016;29(6):664-674.
   DOI: 10.1108/IJHCQA-08-2015-0104
   Copyright © 2016, Emerald Publishing Limited.

4. **Katoue MG**, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities to implement pharmaceutical care in Kuwait. Pharm Pract (Granada). 2016;14(2):680.
DOI: 10.18549/PharmPract.2016.02.680
An open access article available from:
https://scielo.isciii.es/pdf/pharmacy/v14n2/original2.pdf
(Accessed 15 August 2021).
The author retains the copyright of the article which is licensed under a Creative Commons Attribution License (CC-BY-NC-ND) that permits others to share the work with an appropriate credit to the authors and the initial publication of the aticle in Pharmacy Practice.

5. **Katoue MG**. Role of pharmacists in providing parenteral nutrition support: current insights and future directions. Integr Pharm Res Pract. 2018;7:125-140.
DOI: 10.2147/IPRP.S117118
An open access article available from:
https://www.dovepress.com/getfile.php?fileID=44921
(Accessed 15 August 2021).
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Appendix 4: Key Publications Described in Chapter 4

The key publicaitons have been removed from this electronic copy of the thesis for copyright protection. A list of the publicaitons presented in Chapter 4 and their electorinc links and copyright information are provided below:

1. **Katoue MG**, Al Haqan A. Implementation and evaluation of a workshop on patient counselling about antidiabetic medications for final-year pharmacy students. Med Princ Pract. 2013;22(5):489-494.
   DOI: 10.1159/000350840
   An open access article available from:
   https://www.karger.com/Article/Pdf/350840
   (Accessed 15 August 2021).
   The article is licensed under the terms of the Creative Commons Attribution-Non Commercial 3.0 Unported license (CC BY-NC) (applicable to the online version of the article only) by Karger Open access.

2. **Katoue MG**, Schwinghammer TL. Competency-based pharmacy education: an educational paradigm for the pharmacy profession to meet society's healthcare needs. In Fathelrahman AI, Ibrahim MI, Alrasheedy AA, Wertheimer AI, editors. Pharmacy education in the twenty first century and beyond: global achievements and challenges. London: Elsevier Academic Press, 2018.
   https://doi.org/10.1016/B978-0-12-811909-9.00012-5
   Copyright © 2018 Elsevier Inc.

3. **Katoue MG**, Schwinghammer TL. Competency-based education in pharmacy: a review of its development, applications, and challenges. J Eval Clin Pract. 2020;26(4):1114-1123.
   DOI: 10.1111/jep.13362
   Copyright © 2020 John Wiley & Sons, Ltd.

Appendix 5: Key Publications Described in Chapter 5

The key publicaitons have been removed from this electronic copy of the thesis for copyright protection. A list of the publicaitons presented in Chapter 5 and their electorinc links and copyright information are provided below:

1. **Katoue MG**, Awad AI, Al-Jarallah A, Al-Ozairi E, Schwinghammer TL. Medical and pharmacy students' attitudes towards physician-pharmacist collaboration in Kuwait. Pharm Pract (Granada). 2017;15(3):1029.
   DOI: 10.18549/PharmPract.2017.03.1029
   An open access article available from:
   https://www.pharmacypractice.org/index.php/pp/article/view/1029/526
   (Accessed 15 August 2021).
   The author retains the copyright of the article which is licensed under a Creative Commons Attribution License (CC-BY-NC-ND) that permits others to share the work with an appropriate credit to the authors and the initial publication of the aticle in Pharmacy Practice.

2. **Katoue MG**, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty. J Interprof Care. 2021;35(2):208-216.
   DOI: 10.1080/13561820.2020.1713062
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3. **Katoue MG**, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and perceptions of health sciences students. J Interprof Care. 2022;36(1):117-126.
   DOI: 10.1080/13561820.2021.1884537.
   Copyright © 2021 Taylor & Francis Group, LLC.

4. **Katoue MG**, Iblagh N, Somerville S, Ker J. Introducing simulation-based education to healthcare professionals: exploring the challenge of integrating theory into educational practice. Scott Med J. 2015;60(4):176-181.
DOI: 10.1177/0036933015607272
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5. **Katoue MG**. "As if": a tool for experiencing team-based care. Clin Teach. 2020;17(6):723-725.
DOI: 10.1111/tct.13160
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